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PSYCHOSOMATIC MEDICINE—VOL. III, NO. 3, JULY, 1941

A PSYCHOSOMATIC STUDY OF THE SEX CYCLE IN WOMEN*

M. ALTMANN, E. KNOWLES AND H. D. BULL**

AN ATTEMPT is being made to correlate phases of the female sex cycle with mental or physical states including some not apparently connected with sex. While the direct correlation of phases of the sex cycle with drive or other repressed sex manifestations has been successfully uncovered by other workers using the psychoanalytic method, we thought that there would be an opportunity to investigate non-repressed mental states in their relation to the phases of the cycle by psychobiological methods. The advantage of these methods is quite obvious. They can be applied to normal people without much inconvenience and no special difficulty will arise in validating them and far less complications will arise from their application. If the attempt is successful, one will be able to label the phases of the sex cycle with perhaps unsuspected and easily detectable markers, as, for example, high tension shortly before menstruation.

With the recent progress of hormone chemistry many brilliant advances have been made toward a detailed recognition of the phases of the female sex cycle. But it is obvious that additional, psychosomatic methods of investigation have to be used in order to understand and successfully deal with the complex problems confronting us in connection with the human sex rhythm. Whether by virtue of the greater variability of human sex function or of the circumstance that we, as humans, have better eyes to see the variations in ourselves than we have for those in animals, the fact seems clear that a much more complex problem, involving psychic and physical manifestations, has to be dealt with. If a deeper understanding of the factors involved can be reached, it would enable the individual to deal more successfully with the sex rhythm in its normal as well as its abnormal manifestations. Further knowledge of woman's sex cycle would aid her in planning her work on a sensible biological basis.

While the attempts to study mental and physiological factors in the female sex cycle have been numerous (*9*, *14*), there seems to be a definite need for further investigation of some phases using the detailed recent knowledge of the hormonal fluctuations during the cycle and its implications for the emotional life. In general, answers to questionnaires, statistics based on health records, and psychological inventories have been enlisted with varying success (*cf.* Landis, *8*). The difficulties that ordinarily confront an analysis of complex problems were enhanced in this study by the traditional unreliability usually exhibited in answering questions concerning sex. It was, therefore, a great step forward when a team of scientists (Benedek and Rubenstein, *4*) decided to investigate the human female rhythm without the handicap of the usual inhibitions, by the use of psychoanalytic procedure in neurotics, and to check their findings with a step by step correlation by proven physiological methods. The attempt has been successful for the major part of the human cycle; nevertheless, their ap-

* The expenses of this study, which is part of a more extensive investigation of the estrus cycle in relation to behavior, were in part defrayed by a grant to H. S. Liddell from the Josiah Macy, Jr. Foundation.

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proach involves many difficulties and could not easily be applied to normal, healthy women. We have tried to learn from the experience of the psychoanalyst and have used a method which deals with individual cases by a daily personal interview, avoiding questionnaires or fixed psychological routine.

An attempt was made to use a progressive group of college women for daily interviews with one of us during which a detailed report of the psychic conditions was given by each subject and several physiological measurements and tests were applied. Since the mental states recorded were from the non-repressed, conscious level, and no pressure was used to learn of them, the resistance encountered was low at the beginning and in almost all cases waned as soon as confidence in the experimenter grew.

The mental tests concerned conditions not obviously connected with sex, such as fatigue, moods, level of activity, while the physiological records concerned indications of the sex cycle such as the D.C. skin potential, rectal temperature, heart rate, and vaginal smear. By this method we hoped to be able to label the phases of the sex cycle with easily detectable markers and to discover heretofore not known interrelations.

Methods and Material

A study of the psychosomatic conditions of ten mature college women during fifty-five sex cycles was undertaken. An attempt was made to get normal, healthy individuals, regardless of differences in physical type and character. The subjects were all given a thorough physical examination. Eight of these women were single, two were married. Ages ranged from 22 to 36 years, with an average of 27 years. They were placed, according to age, in three groups; younger (21–23), middle (24–27) and older (30–36). All took college course work; two were instructors, two were undergraduate seniors, and six were graduate students. With the exception of one of the graduate students, all were connected in some capacity with the College of Home Economics, which brings them in rather close contact with the life of the homemaker. The subjects did not belong, therefore, in the class of career women.

The subjects volunteered as subjects for the study, their interest being mainly to learn more about themselves. The interest of the women in the forthcoming records of their own cycles was, without exception, a surprisingly intense one. This circumstance served as a welcome and strong motivation for cooperation which did not fade with the progress of the study, and which often necessitated great sacrifices in time and effort, since ovulation tests frequently had to be taken at odd times. The selection of tests used in this study was made on the basis of our own preliminary experiments together with suggestions from the literature.

The investigation of each case covered a period of five months. The women were instructed to take their basal body temperature every morning, when still in bed, with a special, easily readable rectal thermometer, and to enter the temperature in a record sheet which they had to turn in daily. At a prearranged time every day each subject visited the experimenter in her office for the interview and the physiological tests. The pulse rate was taken by the experimenter while the subject relaxed on a day-bed, while the vaginal smear was taken by the subject herself under the supervision and instruction of the experimenter, and immediately labelled and fixed for staining.

Then the subject was tested for the marked increase in electrical potential between the index fingertips which is

associated with ovulation. For this purpose a suitable D. C. microvoltmeter, designed by Parmenter, (*11*) was used. By way of observing the vaginal smear, careful records were kept on the duration of the cycle, the days of bleeding, the discharge of the vagina, and intermenstrual bleeding.

During the interview notes were made on the occurrence of pain, quality and hours of sleep, physical and mental activity, mood, worries, tension, irritability, and fatigue. We considered tension as a condition of unspecified anxiety and worry (unborn worry). The rating of tension, activity, mood, worry, irritability and fatigue was made by the experimenter and was based upon the subject's own report during the interview. The rating comprised 0–5 grades, with zero meaning none and five meaning extreme.[1] Direct questions were avoided, and in the course of the experiment the subjects would talk so freely about their daily experiences and reactions that the interviewer was supplied with ample material.

The vaginal smears were stained in groups according to the classical method of Papanicolaou, (*10*). They

[1] Zero is the same for each individual.

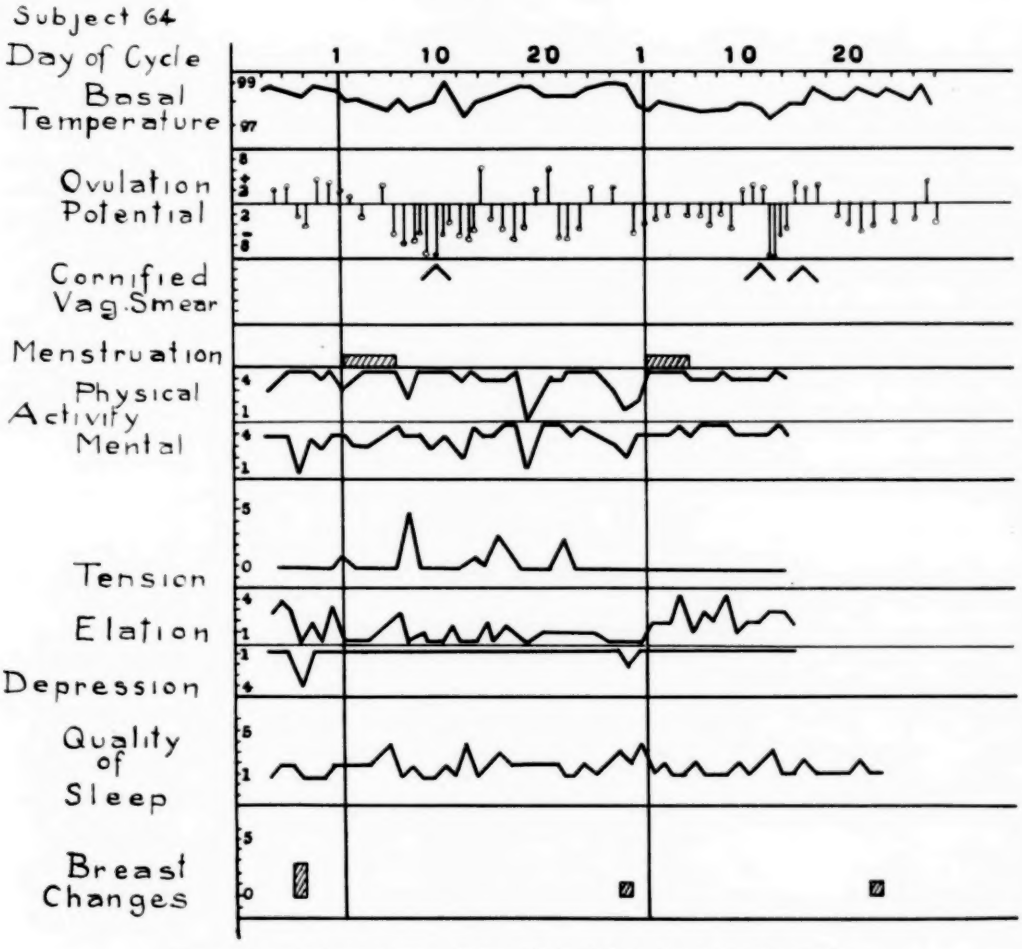


FIG. 1. A typical graph. The relation of physiological and mental records during two sex cycles in subject 64.

were carefully interpreted as to the sexual stage and compared with the electrical evidence for ovulation. This new method of determining the exact time of ovulation, originally developed by Burr, Lane and Nims, had been used by us in previous studies on ovulation in the pig, (*1*), goat, (*2*), and fowl, (*3*).

The basal rectal temperature curve was observed because it had been shown by Rubenstein, (*12*), to indicate the approach of the ovulation phase by a distinct drop in temperature and of the menstrual phase by a high temperature.

From the material gathered a detailed case history was worked out for each subject and from these the general trends were interpreted. The individual case histories in the latter part of this paper will bring a more detailed description of the type as well as of the character of the subjects, while the general aspects of the ten cases and their interpretation are given first. The cycles of a typical case are depicted graphically in figure 1. The data for all cases are combined in tabular form and graphs.

General Aspects of Cycles Observed

The number of cycles observed was fifty-five, with the following distribution:

1 subject	4 cycles
4 subjects	5 cycles
4 subjects	6 cycles
1 subject	7 cycles

The lengths of the cycles varied from 23 to 61 days, with an average duration of 29.6 days. The average day of ovulation determined by the electrical method was the 11.8th day of the cycle, with a variation from the 5th to the 23rd day. Very rarely did the same subject repeat the day of ovulation in consecutive cycles. Irregular spacing of ovulation was by far more frequent than irregularities of the menstrual bleeding. Therefore no more uniform figure was reached when the number of days from ovulation to the next menstruation was calculated. The evidence for the occurrence of ovulation was based on 1,258 electrical tests, and was in 85 per cent of the cases confirmed by the vaginal smear test (see tables and graphs).

TABLE A

Data on Sex Cycles and their Phases

Subject	Serial number of cycle	Cycle length in days	Menstruation length in days	Day of ovulation determined by		Percentage of cycle elapsing before ovulation	Number of days from ovulation to beginning of next cycle	Peak in millivolts on ovulation day	Average non-ovulatory potential
				Electrical test	Smear test				
32	1	35	5	14	14	40	21	+17.0	2.84
	2	29	5	10	10	34.5	19	+ 5.9	3.01
	3	34	5	7	7	20.6	27	+ 7.7	3.14
	4	34	3	6	6	17.7	28	+21.1	3.70
	5		3	9	9			+11.5	3.18
							Average:	12.64	3.17
36	1	28	4		15				6.51
	2	29	3		7				3.58
	3	28	3	10	10	37.5	18	+13.7	2.96
	4	29	4	15	15	51.7	14	−12.1	3.30
	5	28	5		15				2.15
	6	32	3		8				3.38
							Average:	12.9	3.65

TABLE A (Continued)

Subject	Serial number of cycle	Cycle length in days	Menstruation length in days	Day of ovulation determined by		Percentage of cycle elapsing before ovulation	Number of days from ovulation to beginning of next cycle	Peak in millivolts on ovulation day	Average non-ovulatory potential
				Electrical test	Smear test				
40	1	49		16	16	32.7	33	−17.2	3.54
	2	22	5	18	18	81.8	4	−15.6	3.19
	3	28	6	8	11	28.6	20	+25.2	3.17
	4	24	5	19	8	79.1	5	−10.2	3.52
	5	61	6	19	19	31.1	42	−13.2	3.91
							Average:	16.28	3.47
44	1	26	5	11	14	42.3	15	+ 5.9	3.78
	2	28	6		13				
	3	24	5	16	16	66.7	8	+ 9.7	3.18
	4	25	4	vacation					
	5	28	5	5	7	17.8	23	−19.5	4.06
	6	26	4	11	11	42.3	15	−28.4	2.39
							Average:	15.7	3.35
48	1	27	5	19	19	70.3	8	+ 7.5	3.61
	2	23	5	11	9	47.8	12	+12.3	4.43
	3	24	6	20	16	83.3	4	+10.5	6.09
	4	29	6	10	10	34.5	19	+ 5.3	4.51
	5	25	6	11	14	44.0	14	+ 7.0	2.57
	6	24	6	12	12	50.0	12	− 5.9	3.10
	7		6	12	12		13	+ 7.4	3.60
							Average:	7.98	3.99
56	1	29	4	9	10	31.0	20	− 7.2	2.97
	2	34	4	10	10	29.4	24	+12.7	2.69
	3	26	4	5	6	19.2	21	−16.1	3.67
	4	28	5	8	9	28.6	20	+ 7.0	3.94
							Average:	10.77	3.31
60	1	28							
	2	33	6	11	11	33.3	22	+19.2	4.98
	3	25	6	16	16	64.0	9	+13.7	3.79
	4	46		23	23	50.0	23	− 8.0	3.70
	5	35	6	21	21	60.0	14	+10.0	3.76
							Average:	12.7	4.05
64	1	24	5	8	13	33.3	16	− 6.8	2.86
	2	25	5	10	11, 10	40.0	15	− 8.2	2.97
	3	26	5	10	10	38.5	16	−10.6	3.32
	4	27	5			vacation			3.13
	5	28	5	9	9, 17	32.1	19	−15.6	4.32
	6	27	4	12	12	44.4		−12.0	2.75
							Average:	10.64	3.18
68	1	26		9	9		17	− 5.0	2.79
	2	25	4	9	13	36.0	16	+ 8.4	4.50
	3	25	5	8		32.0	17	+ 8.0	4.03
	4	24						− 7.8	3.17
	5	24	4	10	10	41.6	14	+10.2	3.54
	6	26	4	7	8	26.9	19	− 7.8	3.58
							Average:	7.88	3.60
76	1	35	4		13				3.37
	2	35	5	9, 14	21	25.7	26	+10.7	4.82
	3	34	5	6		17.6	28	+ 9.1	3.84
	4	34	6	22	23	64.7	12	+ 7.0	2.80
	5	39	6	10	10	25.6	29	+ 8.8	3.81
							Average:	8.90	3.72

TABLE B

BASAL RECTAL TEMPERATURE

Subject	Number of cycle in subject	Average temperature	Day of highest temperature	Highest temperature	Day of lowest temperature	Lowest temperature	Temperature difference
32	3	98.4	29, 30, 31	99.0	7–8	98.0	1.0
	4	98.7	26	101.0	4–7	98.2	1.2
	5	98.3	2	99.4	4–8	98.0	1.4
36	3	97.88	12	98.6	6	96.4	2.2
	4	98.22	28	98.8	13–14	97.6	1.2
	5	98.21	24	98.7	5	97.6	1.1
	6	97.97			2–9–11	97.7	
40	3	97.7	17	98.0	20	97.2	0.8
	4	98.5	23	99.1	6	97.6	1.5
	5	97.9	1	98.9	35	97.5	1.4
44	2	98.5	23	99.6	15	97.9	1.7
	3	98.6	24	99.3	6	97.6	1.7
	4	98.6	21	99.2	2	98.0	1.2
	5	98.4	24	99.2	7	97.8	1.4
	6	98.3	25	99.0	8	97.6	1.4
48	3	98.5	1	99.2	9	98.1	1.1
	4	98.4	20	99.6	11	98.0	1.6
	5	98.7	20	99.4	10	98.2	1.2
	6	98.5	2	100.0	12	98.2	1.8
56	3	98.5	6	99.0	4–7	98.0	1.0
	4	98.5	22	99.2	4–13	98.0	1.2
	5	98.0	6	98.4	7	97.6	0.8
60	3	97.7	38	98.6	16	97.2	1.4
	4	97.8	45	99.0	17	97.2	1.8
	5	97.6	1	99.2	19	97.0	1.2
64	3	98.4	19	98.8			
	4	98.5	26	98.8	4	97.6	1.2
	5	98.2	28	98.7	12	97.4	1.3
	6	98.2	24–26	98.6	12	97.3	1.3
68	3	98.8	20	101.1			
	4	98.3					
	5	98.7	21	99.0	8	97.8	1.2
	6	98.4	13	99.2	3	98.0	1.2
	7	98.0			6	97.9	
76	3	98.4	34	99.7	26	97.7	2.0
	4	98.3	9	100.0	15	97.7	2.3
	5	98.1	3–16	98.5	5–6–7	97.8	0.7

Temperature: Additional evidence for the occurrence of ovulation was taken from a rectal temperature curve (*13*). The inference, from the rectal temperature, that ovulation had occurred coincided in only 57.8 per cent of the cases with the time of ovulation inferred from the peak in index finger potentials. The explanation of the rather low coincidence might be found in the difficulties of getting comparable temperature readings in the subjects. Up to December 9 the temperature records do not represent the basal temperature but were taken during the interview at noon. It has also to be kept in mind that the vaginal smear test as well as the temperature curve are methods of estimating the time of ovulation in a broad sense. The alteration of the vaginal smear content is based upon the action of hormones in fluctuating

amounts, the temperature change is based upon metabolic changes of the whole body. Nevertheless, low temperature preceding ovulation was a good criterion in 7 out of 10 cases.

Bioelectric ovulatory potentials: The bioelectric potential differences of the non-ovulative phases averaged 3.17–4.05 millivolts per subject. The highest potential at the suspected time of ovulation was selected and showed averages from 7.88–16.28 mv. The so-called ovulatory potential was taken as the highest or most extreme bioelectric difference during an ovulatory plateau. No attempt was made in this study to observe the continuous bioelectric pattern of the subject for the duration of the plateau. An example of a typical record at ovulation time follows:

SUBJECT #40

Date	Hour of Test	Day of Cycle	Millivolts
Nov. 23	1:00 P.M.	16	− 1.8
Nov. 24	1:00 P.M.	17	− 1.8
Nov. 25	10:15 A.M.	18	− 6.4
	12:00 noon	18	− 6.4
	6:00 P.M.	18	− 9.2
	10:00 P.M.	18	−13.7
	11:30 P.M.	18	−15.6
Nov. 26	2:00 P.M.	19	− 6.4
Nov. 27	1:30 P.M.	20	− 1.9

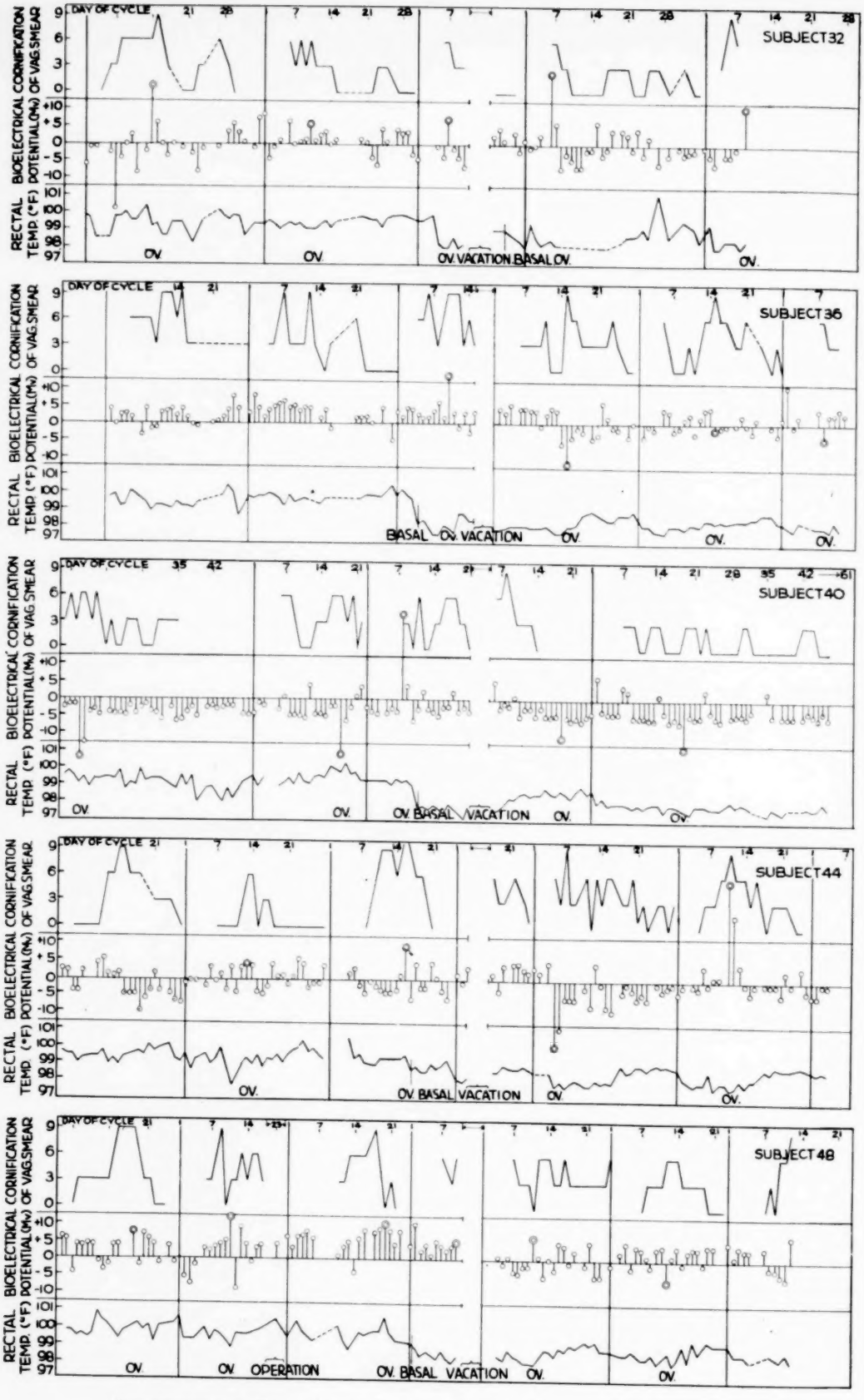
Expressed in percentage increase, the ovulation potential was 341.7 per cent higher than the non-ovulatory average. It is believed that the data on ovulatory increases in body potentials represent random samples of the ovulatory plateau. Since the tests were made by dipping the index fingers into a saline bridge containing the silver-silver chloride spot electrode, a continuous record was not available. But the subjects volunteered freely for numerous additional tests on days when ovulatory rises were spotted. The highest ovulatory potential was 28.4 mv. occurring of the 11th day following the onset of the preceding menstruation. High potentials were found for other than ovulatory causes only in the cases of skin lesions, particularly when the lesion was on the index fingers and when immersed in the solution. A careful check of the fingers, including the nail-bed, was undertaken before each test.

Skin temperature: A record of fingertip skin temperature was taken with the aid of a specially constructed thermocouple. The difference in temperature of both index fingers did not parallel the curve of electrical potentials.

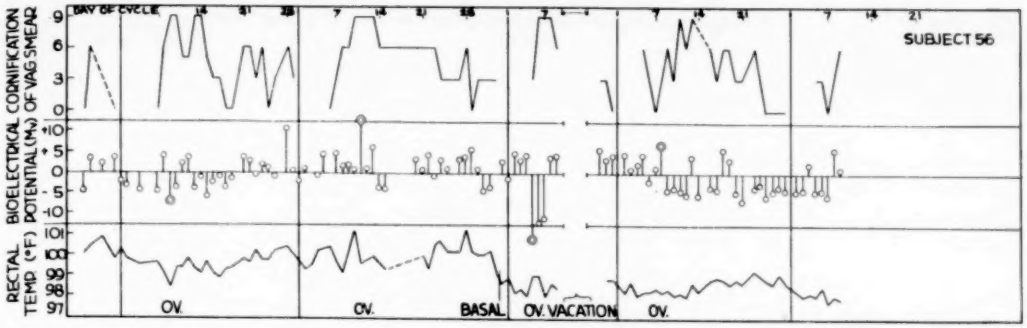
TYPICAL CASE OF DIFFERENCES IN BIOELECTRIC POTENTIAL AND TEMPERATURE OF INDEX FINGERTIPS

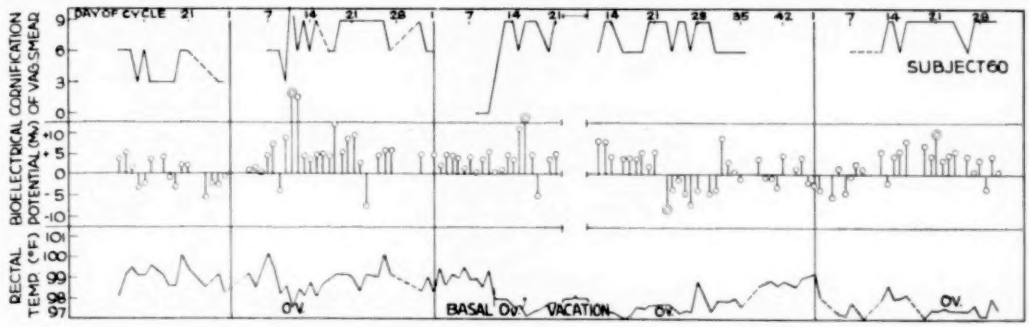
Date	Day of Cycle	Finger Potential in millivolts	L-R Finger Temperature Difference in °C.
Jan. 16	5	+2.5	+0.5
17	6	−1.7	+0.5
18	7	−2.6	+0.3
19	8	+0.9	+1.0
20	9	−2.6	+1.5
21	10	+10.2	+0.2
22	11	−1.7	+1.5
23	12	−0.8	+0.5
24	13	−5.3	−0.2
25	14	+6.1	0
26	15	+5.9	+2.1
27	16	−4.5	−0.7
28	—	—	—
29	18	+2.6	+1.0
30	19	+1.8	+1.0
31	20	+3.6	+0.5
Feb. 1	21	−1.9	+0.9
2	22	−4.7	+0.2
3	23	+4.0	+0.7
4	—	—	—
5	1	−1.5	0
6	2	+0.7	+1.6
7	3	+3.0	+0.2
8	4	+5.7	+0.3
9	5	−1.7	−0.3
10	6	+5.8	−0.1
11	7	−7.8	−0.6

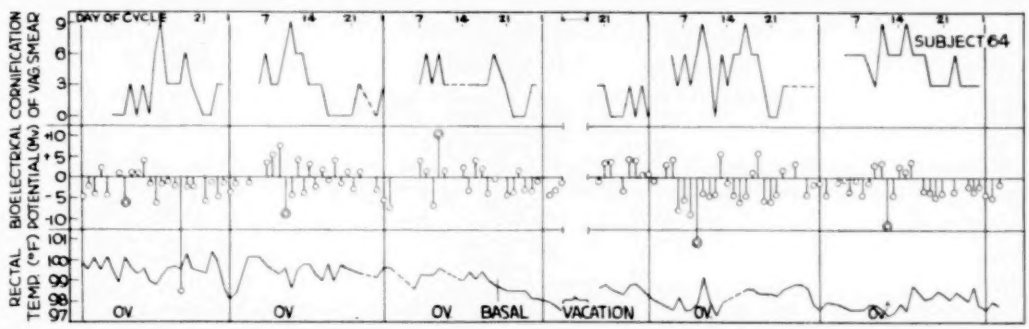
It can be concluded from this phase of the experiment, which covered a month of daily tests in 10 subjects, that the electrical potential differences and particularly the increases during the time of ovulation, were not due to a difference in temperature between the two points of contact, as postulated by Snodgrass (*18*).

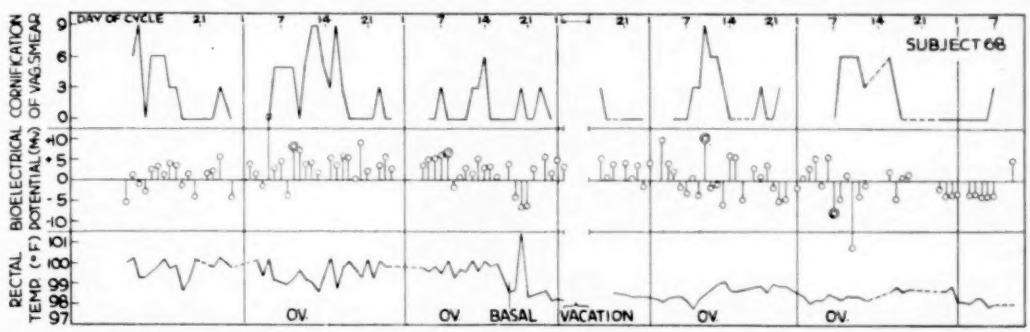


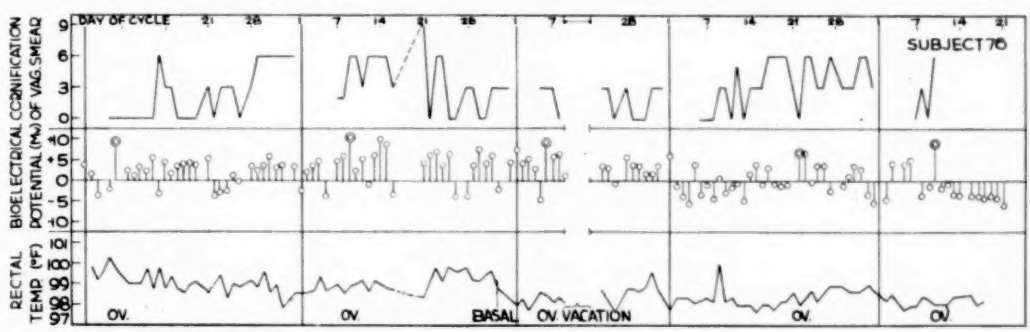
RELATIONSHIP OF PHYSIOLOGICAL TESTS TO SEXUAL CYCLES IN TEN SUBJECTS


DAY OF CYCLE
SUBJECT 56
BIOELECTRICAL CORNIFICATION POTENTIAL (MV) OF VAG. SMEAR
RECTAL TEMP (°F)
OV.
OV.
BASAL
OV. VACATION
OV.


DAY OF CYCLE
SUBJECT 60
BIOELECTRICAL CORNIFICATION POTENTIAL (MV) OF VAG. SMEAR
RECTAL TEMP (°F)
OV.
BASAL
OV.
VACATION
OV.
OV.


DAY OF CYCLE
SUBJECT 64
BIOELECTRICAL CORNIFICATION POTENTIAL (MV) OF VAG. SMEAR
RECTAL TEMP (°F)
OV
OV
OV.
BASAL
VACATION
OV
OV


DAY OF CYCLE
SUBJECT 68
BIOELECTRICAL CORNIFICATION POTENTIAL (MV) OF VAG. SMEAR
RECTAL TEMP (°F)
OV.
OV.
BASAL
VACATION
OV.
OV.


DAY OF CYCLE
SUBJECT 76
BIOELECTRICAL CORNIFICATION POTENTIAL (MV) OF VAG. SMEAR
RECTAL TEMP (°F)
OV.
OV.
BASAL
OV.
VACATION
OV.
OV.

Vaginal smear: 868 vaginal smears were examined after the method of Papanicolaou (*10*). Shorr's (*15*) new method of staining the vaginal smear which yields a distinct color reaction and allows for a more differentiated interpretation, was not yet developed at the time when the material was gathered. The cyclic smear changes in the subjects were followed carefully and compared with the other criteria for the different sex phases, such as electrical potential and rectal temperature. In general there was a rather weak expression of the phases of the cycle in the subjects' smears, although cyclic changes were present in all. The estimation of hormone level led to the assumption in some cases of a slightly subnormal hormone level. This finding seems to support the belief (*16*) that many college women have weak cyclic smear changes because they represent a group selected for intellectual attainment. One must also keep in mind that lack of outdoor exercise and abrupt changes in living conditions can be responsible for weak cyclic expression in the smear.

Changes in the breasts were observed in 8 out of 10 cases. Seven of the subjects had a premenstrual high in tenderness of the breasts, while one subject had the tenderness during the preovulatory stage.

Menstrual pain in the form of cramps was also experienced by 8 subjects out of 10. Vaginal discharge occurred at frequent intervals in one case, four subjects had post-ovulative, four post- or premenstrual discharge. In one subject acute thirst occurred previous to the onset of menstruation. Nose itching or other skin phenomena were not found to be of a cyclical character in any of the subjects.

Pulse rate: There was in general no cyclic fluctuation of the pulse rate. In two subjects a high rate was found during the premenstrual and menstrual phases, and there was one case with a low pulse rate during menstruation.

Anovulatory cycles: The cycles which were characterized by an apparently normal menstruation but in which ovulation could not be detected with the bioelectric method were rather infrequent. They numbered only 11 per cent in our experimental group, as compared with the incidence of 46 per cent in Rubenstein's material. The latter percentage, however, included a large group of sterility patients.

While there exists a definite possibility that the ovulative plateau was very short-lived and that the ovulation proper has here been missed, it may be suspected that these cycles were true anovulatory ones. The vaginal smear picture and the rectal temperature curve during those cycles indicated hormonal fluctuations but did not show a clear-cut indication that ovulation had occurred. The ovulative phase, particularly on the day of ovulation, was in 67.5 per cent of the cases related to a mood of elation. This elation occurred on the day of ovulation proper, or one day preceding or following ovulation.

Physical and mental activities were likewise reaching a peak during the time of ovulation in 85.3 per cent of the cases on record, while tenseness was not usually encountered at this time of the cycle. Our records showed that in the majority of cases the physical and mental activity were closely coordinated. In fact, there were only two subjects in whom a discrepancy between mental and physical activity could be found. The peak in activity was not, however, so closely centered about the day of ovulation as was the elated mood. The elation that occurred on the day of ovulation was in all cases recorded at a time when the subject was unaware of the fact that ovulation had taken place on that particular day. This was necessary because it was discovered that

knowledge of the occurrence of ovulation itself caused elations in all subjects, as well as in many other women not included in this study.

The Psychological Records in Relation to the Phases of the Sex Cycle

While detailed consideration will be given to the interrelations to be found among the data when the individual case histories are reviewed (page 210) a general evaluation of the records has been undertaken with the objective of detecting the relation of the ovulative and menstrual phases to moods, activity, and tension in the subjects (see table I below).

TABLE I

Phases of Cycle in Relation to Mood, Activity, and Tension

Ovulation with elation in	67.5% of cases
Ovulation with activity in	85.3% of cases
Ovulation with tension in	31.4% of cases
Premenstrual phase with depression in	61.5% of cases
Premenstrual phase with activity in	71.8% of cases
Premenstrual phase with tension in	80.0% of cases

The premenstrual phase showed in 61.5 per cent of cases a relation to depressed mood. The depression occurred mostly one or two days before the onset of bleeding. This finding confirms a pretty well-known observation. But the still higher incidence (71.8 per cent) of bursts of physical activity and mental activity in that premenstrual phase has, as far as we know, not been previously reported. In the subjects the activity at this time concerned cleaning, putting in order, or mental organizing. In most cases this "tension activity" was accompanied by a critical feeling toward other people and led to conflicts. Premenstrual phase and nervous tension were related in 80 per cent of the cases, and show a significant contrast to the absence of tension during the ovulative phase. While premenstrual tension was most often not connected with a tendency to cry, such cases appeared more frequently at the end of the fall college term and indicate that the severity of the college work at that particular time was responsible for a heightening of the premenstrual tension.

Fatigue: Fatigue could not be considered a cyclic phenomenon, in contrast to the observations of McCance, (9), and in agreement with Hubert, (7), and occurred mostly after long evening hours of work or play. The subjects were generally getting insufficient sleep and managed to get along, with varying success, in overcoming fatigue.

The opinion was quite general among the subjects that their cycle was absolutely regular and that they were always very tired during the premenstrual phase. These general statements were, however, entirely disproved by the detailed analysis of this study.

Weather: An attempt was made to trace influences of the weather upon the subjects. Temperature, humidity, and barometric pressure did not show any relation to mental or physical condition in the subjects during the test period.

The heavy storm of January 25, 1940, however, was related to high nervous tension in four subjects. These women had not reached the premenstrual phase at which high nervous tension would have been expected, but were at the 14th to 23rd days of their cycle. One of these subjects, an aviation student, had to deal with difficulties in the air and this might account for her high tension. Other obvious reasons for high tension could be found in the high pitch reached by college activities at this time. The six other subjects were not apparently influenced by the storm. The evidence of these cases does not seem to be strong enough to warrant any conclusion concerning

the effect of stormy weather. A long term observation in a climate with frequent heavy storms might furnish conclusive results.

Job and family: The emotions exhibited by the subjects in connection with their job and family affairs were rather clearly influenced by the sexual phase in four of the ten subjects. The other six showed to some degree lack of dependence of their emotional reaction on the stage of the cycle. It is obvious that the college work or job plays an overwhelming part in the subjects' lives, and sublimates many of their preoccupations and drives. How much of their non-conscious individuality might have been influenced by the sex phase could not be discovered in this study and must be left to the psychoanalytical method of approach.

Individual Cases

SUBJECT 32

This subject, aged 24, is an underdeveloped, stout, short, serious person. Although in the middle age group she still showed signs of an adolescent mentality. Part of her complications are due to a conflict with her family.

Menstrual cycles: Four complete menstrual cycles were observed, the length of which varied from 29 to 25 days. The bleeding lasted for 5 days in the early winter cycles and only 3 days in the late winter cycle. The day of ovulation as determined by the electrical and vaginal smear methods showed a perfect coincidence during 5 consecutive cycles. The ovulation day varied from the 6th to the 14th day of the cycle, and did not once occur on the same day as in the preceding cycle. Expressed in per cent of the cycle length, the ovulation day varied from 17.7 to 40 per cent. The number of days from the ovulation date to the next menstruation were 21, 19, 27, 28. The expression of cornification in the vaginal smear was very weak, and the slides showed no clear-cut cornification and intense spreading of epithelial cells, but always contained leucocytes and bacteria. In combination with the electrical tests there is, however, reason to conclude that the slight cyclic change in cell content indicates ovarian activity although subnormal.

Ovulation potential: The average non-ovulatory potential of this subject was 3.17 mv. The variation was between 2.84 and 3.70 mv. The ovulatory potential averaged 12.64 mv. with a variation from 5.9 to 21.1 mv. The rather regular spacing of the elevated potentials indicated no abnormality, although the positive direction of all the ovulatory potentials was rather unusual. A single case of high potential was located on the 7th day of the first cycle, while what we believed to be ovulation occurred on the 14th day. The high potential on the 7th day was caused by a severe inflammation of the foot (5). If the non-ovulatory potential average is taken as 100 per cent, the ovulatory potential is 398 per cent in this subject.

Pulse rate: This subject is characterized by a rather steady and low pulse rate. The average pulse during all four cycles was 72.8, the rate at ovulation averaged 74. No special relation to the phases of the sex cycle was found. The lowest records were about 60, and occurred at no consistent day of the cycle. The days of high pulse rate, averaging 83.5 beats per minute, showed no consistency either in relation to the cycles.

Basal, rectal temperature: Subject 32 showed a rather limited cyclic change in temperature. The difference between high and low days in three consecutive cycles varied from 1.0 to 1.4° F. The median temperature occurred at the very end of the cycle or, in two cases, at the second day of bleeding. The lowest temperature occurred between the 4th and 8th day of the cycles. This is

well in accord with expectation, according to the work of Rubenstein.

Records on sleep, mood and activity: Subject 32 is characterized by a chronic lack of sleep. Her job requires her to work late in the evening. This factor has not only the direct physical implication of fatigue but also results in a very complex mental condition which might best be called bitterness against other people. The quality of sleep was often inversely related to the hours of sleep until after Christmas vacation when a very apparent deterioration in quality of sleep took place under the influence of the approaching examinations. Her student life was almost entirely dominated by the success or failure of her classwork. Nevertheless, her physical state was remarkably stable.

There were no indications of breast changes at any time during the cycle. Discharge was frequent and especially during the luteal phase of the cycle.

The physical activity record of this subject coincided with her mental activity record. A high in activity was reached before and after menstruation, a low occurring at the onset of the flow. The data on the health and mental records were, however, not too conclusive because they were limited to a fraction of the period covered by the physiological records and, in addition, were more dependent on her subjective feelings.

Worries were more intense shortly before or at the onset of menstruation. Irritability fluctuated with very minute changes around such a low level that it cannot be considered significant. We are skeptical of the subject's statement that her tendency to cry was zero. Tension did not show clear-cut cyclic changes though it appeared in one case somewhat higher in the middle of the cycle. No depression was reported by this subject during the time of observation, while the periods of elation could be directly traced to successes in school. Fatigue, as mentioned above, exhibited no significant fluctuations, but it will be remembered that she lived continuously under its influence for long periods of time.

SUBJECT 36

Subject 36, aged 30, belongs to the oldest group, rather feminine, of slender to medium build, and serious but soft-spoken in character. Her sex type is normal, and she is married. Her reports concern the sex aspect only sparingly. Her background is distinctly Southern, and she is the straightforward, hard working teacher type. The necessity of keeping up with class work, with thesis preparation, and household work caused her to show a heavy strain toward the end of the first term, but she was able to recover efficiency through short periods of rest.

Menstrual cycles: Six complete menstrual cycles were observed, the length of which varied between 28 and 32 days. The bleeding varied from 3 to 5 days, although she had a premenstrual period of colored discharge which might, according to the interpretation, be added to the period of bleeding. Great difficulties were encountered with this subject in discovering the ovulation date. In only two cycles was it possible to determine with some certainty the day of ovulation. In those cases the other evidence coincided with the evidence from the vaginal smears. In the remaining 4 cycles no rise in electrical potential was discovered. The smear changes indicated a possible ovulation between the 7th and the 15th day. According to these findings the subject ovulated three times on the 15th, once on the 7th, 8th and 10th day of her cycle.

Ovulation potential: The average non-ovulatory potential of this subject was 3.65 mv., with a variation from 2.15 to 6.51. The ovulatory potentials averaged

14.7 mv. and ranged from 12.1 to 13.7. The ovulatory potentials were found sometimes on the plus and again on the minus side and no extreme "wound potentials" were observed. The number of days before the next menstruation were 14 and 18 days respectively at ovulation day. The per cent increase of the ovulatory potential above the normal non-ovulatory potential was 403.

Pulse rate: The average pulse rate during all six cycles of this subject was 80.7 beats per minute. The pulse rate at ovulation was 77. No special relation between sex phases and pulse rate could be found.

Basal rectal temperature: This subject has a very pronounced difference in temperature during each cycle; but the clear-cut relation between high temperature day and menstruation, and low temperature day and ovulation, was not observed. There was a trend toward a higher temperature near the end of the cycle and toward the low temperature in the first half of the cycle. It is possible to assume that the temperature curve would be a more definite indication if this subject were living under more restful and normal conditions as a homemaker.

Records on sleep, mood and activity: This subject tried hard to get enough sleep but with the advance of the first term she was unable to do so and fell more and more behind. If it had not been for her efficient management of her weekend time her work would have been impaired by short hours of sleep. Her ability to sleep well under these circumstances was remarkable. Her Southern temperament helped her to take the ups and downs of class work rather lightly. The major worry centered about her thesis before she started work on it. After she started she was apparently relieved and solved the problem in the short time available.

Worries were rather frequent in this very responsible subject, although by systematic work she was usually able to overcome them quickly. A tendency to cry occurred cyclicly before, or at the onset of, menstruation, at which time irritability increased.

Physical and mental activity showed a very high degree of correlation in this subject. A rapid increase in activity before the onset of menstruation, and a gradual but strong increase toward the middle of the cycle, stand out and may be considered entirely normal. This subject reports the experience of an intense urge to clean the whole house or to do other home work of similar kinds during this activity spell before the onset of menstruation.

Depressions did occur mostly at the end of the cycle, but were not excluded during the middle of the cycle, while the frequent elations center about the middle of the cycle and may be related to her satisfactory sex relations with her husband.

SUBJECT 40

Subject 40, aged 33, belongs to the oldest age group. She is well developed, of a tall, heavy-set type. Her sex type is normal, although she tends toward a quiescent stage. Her reports show her capable of assuming full responsibility in her work. She represents a well balanced type of worker who maintains a considerable amount of outside activity in her spare time.

Menstrual cycles: Five menstrual cycles were observed in this subject. The length has been extremely variable for many years since the subject curtailed her sports activities. The variation was from 22 to 61 days. Bleeding lasted 5 to 6 days. Pain was usually not experienced but, during the long cycles, an uncomfortable, tense feeling persisted for about a week or two preceding the onset of the delayed bleeding. Expressed in cycle lengths, the vari-

ability of her ovulation day was 31 to 82 per cent. The discovery of the ovulation date did not present great difficulties because of willing cooperation at all times. The electrical determinations of ovulation date agreed closely in three cases, in one with a margin of two days, and in one case not at all with the evidence of the smear test. The vaginal smear as such was not particularly instructive in this subject, due to the presence of leucocytes and bacteria in a disturbing amount. The evidence from the smears indicated a rather low estrogenic level. The slight cyclic changes in the smears, however, in connection with the electrical tests, permit the assumption of ovulation' This subject had served in a preliminary study (*cf.* Parmenter) the data from which are well in line with our observations.

Ovulation potential: The average non-ovulatory potential in this subject was 3.47 mv. with slight variation. The potentials during the ovulatory period averaged 16.28 mv., the highest being 25.2 mv., the lowest being 10.2 mv. The percentage of increase of the ovulatory potential over the non-ovulatory potential was 469. The direction of the potential difference was predominantly negative in this subject, particularly during the first two months of the experiment, during which time there were positive readings on only two or three days. In the latter part of the experiment positive readings were obtained more frequently and on some days with ovulatory potentials. No explanation so far advanced seems to account for this phenomenon. The subject is right handed and although her physical strength is rather unusual, she is definitely not of masculine type. In addition to the wide variation in length of cycle the number of days after ovulation before the next menstruation varied from 4 to 42. In subjects exhibiting such variability there would be no "safe period."

Pulse rate: The pulse rate of this subject averaged 78.4 beats per minute, and was unusually steady. No correlation between phases of the cycle and high or low pulse rate could be discovered. The high pulse rate averaged 98.6, the low rate, 68.8, while on the day of ovulation it averaged 80.8.

Basal rectal temperature: The rectal temperature did not show the very pronounced cyclic curve of the average woman. The difference between high and low temperatures was small (between .8° and 1.5° F.). The high in temperature was not confined to the end of the cycle or to the first days of menstruation, and the low had no connection with a definite time before ovulation.

It is rather doubtful whether the evidence from the peaks of electric potential can be considered strong enough to indicate five ovulations during the five cycles observed. The electrical increases may merely indicate follicular development approaching the ovulatory stage but not necessarily the event of follicular rupture in this subject. Perhaps the temperature curve might approximate the normal picture if more exercise and normal rest periods were included in the routine of this subject.

Records on sleep, mood and activity: The hours of sleep were usually sufficient with the exception of the last month of the study when irregularities, mostly due to social activities, prevented the subject from going to bed early. The quality of sleep varied a great deal, apparently not in clear-cut cyclic fashion, although it seems from three instances that the quality of sleep was particularly good the night before ovulation, but, with our system of grading the quality of sleep not too many conclusions can be drawn. Objective measurement of motility during sleep was not attempted since our interest was centered upon the impression of

the night's rest reported by the subject. No insomnia was reported during the last days before menstruation, although the quality of sleep was usually claimed to be poorer at this time.

Breast changes were reported by the subject but do not allow statement as to definite cyclic occurrence. Bleeding was usually not abundant, although it was of greater duration with the long cycles. Discharge was observed during the whole course of the study and might have been related to those periods of fatigue which could not otherwise be explained. No pain during menstruation was reported.

Physical and mental activity were almost always highly correlated with each other. A distinct increase in both activities was noted before the onset of menstruation and seemed to increase the efficiency in quality and quantity of effort to an unusually high degree. Housework, classwork, organizing of research, redecorating furniture, or remodeling clothes were undertaken in addition to all routine doings on such days. In fact, this subject was the first to direct our attention toward that phenomenon which was jokingly called "cupboard disease."

Very little irritability and tension were reported during the first three months of observation of this subject. When time became scarce and work pressed hard, she would become tense, irritable, and sometimes had a slight tendency to cry. Worries played a minor part in her mental life because she managed obstacles easily. Depressions were rare and not very deep-going, and they showed no obvious relation to the sex cycle. Elations, mostly due to success in work or play, were rather short-lived, and occurred around the middle of the cycle.

In this subject, it might be added, a pronounced motherly feeling existed which, in the absence of children, was directed toward members of her family or those needing assistance.

SUBJECT 44

Subject 44, aged 27, is in the middle age group, thin, medium size, nervous, intellectual, married, hypofeminine type. Her reaction to the sexual aspect of life seemed to us slightly neurotic. This subject was engaged in graduate work when she encountered some difficulties between problems of homemaking and her scholastic work. She went on under a strain and eventually resigned graduate work for a limited time.

Menstrual cycles: Six complete menstrual cycles were observed which varied between 24 and 28 days. This subject showed the least variability in length of cycle, and reported that she had been as regular for many years. The bleeding lasted from 5 to 6 days, with sex drive almost invariably increased while bleeding was still under way. Intermenstrual bleeding was observed in some cases. Despite the regularity of the menstrual cycle there were great difficulties encountered in determining the time of ovulation. Ovulation was located only twice with any degree of certainty during the 6 cycles, while two other peaks in finger potential could be taken as weak evidence of its occurrence. In only two cases was there agreement between the findings of the electrical and vaginal smear methods. The evidence from vaginal smears in general was good and indicated cyclic changes. It seemed to us, however, that coitus might possibly influence the cornification of the vaginal epithelium. It was repeatedly observed that cornification was perfect in the smear when spermatozoa were present.

Ovulation potential: Including the two possible, but doubtful, ovulations, the average peak potential was 15.7 mv. compared with a non-ovulatory

average of 3.35 mv. The per cent increase of the ovulatory as compared with the non-ovulatory potential was 469. The "electrical" ovulation date varied between the 5th and 16th day, a surprising variability if one considers the regularity of the cycle. In this subject wound potentials were a disturbing feature, and several times furnished a high reading when no other evidence pointed toward ovulation. A tendency to gnaw the fingernails was disturbing because all abrasions of the epidermis, particularly those resulting in inflammation of the nailbed, interfere with normal readings.

During the latter part of the experiment the subject had an injured index finger at a time when ovulation would have been possible. The experimenter made no comment and the subject enjoyed the idea of having ovulated at the expected time. We have found that the evidence of having ovulated seems to give much satisfaction.

Pulse rate: The average pulse rate for six cycles of this subject was 79.2. The rate at ovulation was 81 while the highest average rate was 89.7 and the lowest 65.3. There was a slight tendency for the high rates to appear during the menstrual or premenstrual days, while the low rate showed no particular cyclic distribution.

Basal rectal temperature: A good cyclic temperature curve was found, the difference between high and low varying from 1.2° to 1.7° F. per cycle. The high temperature occurred between the 21st and the 25th days in all cycles observed, and the low between the second and 15th day. This case provides a very good example of the cyclic changes in basal rectal temperature reported by Rubenstein. Considering again the results of the vaginal smear test and the temperature curve, as well as the regularly spaced menstrual bleeding in this subject, one would be inclined to conclude that ovulation did occur regularly. Why the electrical tests were so inconclusive in this subject has not been explained, but one possibility is that she might exhibit a very brief ovulatory plateau and that the spot determinations made did not hit the peak of potential difference. Another explanation might be found in the hormonal picture where all psychobiological functions leading up to the rupture of the follicle would be normal, but then the bursting of the follicle might not occur but regression or cyclic degeneration take place instead.

Records on sleep, mood and activity: In contrast with other subjects, quality and duration of sleep varied greatly, often showing inverse relation to one another. This inverse relation might have been due in part to strenuous social activities.

Breast changes were recorded very regularly for a week before menstruation, often including a feeling of tightness and slight pain. Discharge was infrequent, with the exception of times when the subject had a cold.

Physical and mental activity were highly correlated in the *reports* of this subject. In her case, however, it was suspected that definite wishes and expectations might easily influence the accuracy of the day to day report. High activity before menstruation was not typical of this individual, but low activity at the onset of menstruation, followed by an enormous rise, and a regression after ovulation seemed to be the usual sequence.

Tension increased before menstruation and varied within narrow limits. With the higher tension there was a tendency to cry. Worries undoubtedly occurring in the subject's life were not reported and seemed to vanish before the impending interview. A very detailed report of elation was presented which clearly showed its rise at the

midmenstrual period and its quite apparent relation to sexual satisfaction. On the other hand, the curve of depression was highest at the time of menstruation. Fatigue varied so greatly and continuously that no attempt could be made to evaluate its cyclic connection.

SUBJECT 48

This subject, aged 22, is of the heavy set, feminine type, of nervous disposition, and belongs to the youngest age group, but looks older. Her sex type is normal; she is engaged and unusually excited about it. A religious conflict complicates her engagement. Her disposition is emotionally unstable. Her job in a field without special interest to her is a source of countless conflicts, first with her colleagues and then with her superiors.

Menstrual cycles: Six complete menstrual cycles were observed in this subject, the length of which varied from 23 to 27 days. Bleeding lasted from 5 to 6 days. Ovulation, as determined by electrical and by vaginal smear methods did not always show a perfect coincidence, and in 3 out of 7 detected ovulations there was a more or less pronounced discrepancy. According to the smear method ovulation occurred between the 9th and 19th day; according to the electrical method between the 10th and 20th day. Leucocytes were almost always present in the smears and ovulatory bleeding was also observed. The cyclic changes in the smear content justified the assumption of a normal, though slightly weak, sex cycle.

Ovulation potential: The average non-ovulatory potential in this subject was 3.99 mv., ranging from 2.57 to 6.09 mv. per cycle. The ovulatory potential presented great difficulties for reasons which have to be explained in some detail. No case was recorded where her readings went above 13 mv. and most of the so-called ovulatory readings were far lower. The average of 7 ovulatory records was 7.98 mv. One reason for these rather weak ovulatory potentials lies in the fact that she was not readily available for observation as the other subjects and hence fewer sample readings were taken. Another reason for the absence of high ovulatory potentials might have been her treatment in a hospital, which included the introduction of a stem pessary, causing irritation and discharge. An interesting observation was made after she returned from the hospital still wearing the stem pessary. Her potentials were higher than usual at this stage, and rose to an even higher level than some of her so-called ovulatory readings. Her ovulatory date was determined by a high reading (10.5 mv.) and slight ovulatory bleeding, but it is possible that this elevated potential, too, was caused by uterine irritation. Considering the effect of skin lesions on the potential, it is conceivable that lesions in the uterine lining gave wound potentials of this type. This subject is therefore interesting for this particular variation of test conditions, and her record cannot be included without comment in the general ovulation data.

Pulse rate: The pulse rate in this subject was very variable on account of the emotional state prevailing at the time. No correlation of high or low pulse rate with the sex phases could be detected. A striking influence of her anxiety about her job and family conflicts was noted in the pulse rate during the interview. A question by the experimenter as to the outcome of a conflict would bring about a rise of 20 beats per minute.

Basal rectal temperature: Pronounced cyclic change in basal rectal temperature, with the particularly marked decrease before ovulation, was found in

this subject. The temperature range varied between 1.1° and 1.8° F. The high temperature day occurred between the 20th and 22nd day of the next cycle, the low between the 9th and the 12th day, which is well in accord with the expectancy.

Records on sleep, mood and activity: Wide variation in hours of sleep was due to frequent weekend trips. The quality of sleep varied often inversely with the hours of sleep because with only three or four hours of sleep the subject was tired enough to sleep well even with worries and all sorts of external disturbances. Fatigue was a constant factor in this subject's life, probably more on account of her disinterest in her work than for physical reasons, although her operation and period of recovery may have contributed.

Serious pain and discomfort during the first day of bleeding were regularly reported. Changes in the breasts preceded that time and a discharge appearing after ovulation continued up to the onset of the next menstruation. Mental and physical activity were not entirely coincident in this subject. She reported mental activity as much higher than physical, and neither showed any definite cyclic relation. The physical activity was definitely low during menstrual days and did not stay high for long periods.

As regards worry, irritability and tension, these emotional data showed such a turmoil of ups and downs that it would be futile to attempt correlation with any function. It would happen, after a conference exciting to the subject, that she would come to the interview reporting extreme worry and immense irritability when there were no signs of tension or impending tears. Very few elations were reported during the experimental period and depressions prevailed. According to her account, she lived in the depths of depression for weeks at a time and was kept going only by counting the days until her marriage.

SUBJECT 56

Subject 56, aged 22, is of slender build and medium size. She belongs to the youngest age group. Her sex type is normal. She is in love and gives a sparkling impression on first sight. Both parents are alive and she is a graduate student making her own living. Taking part in an experiment with children, she has little time to herself. Having lost her job she secured another within a few days. In spite of such vicissitudes she remains sparkling and humorous.

Menstrual cycles: Four menstrual cycles were studied in this subject, varying from 26 to 34 days. Bleeding lasted 4 to 5 days. The date of ovulation as determined by electrical and smear methods corresponded within one day. The smears contained a great deal of impurities but showed good cyclic changes. The ovulation day occurred between the 5th and 10th days of the cycle and no intermenstrual bleeding was observed. Expressed in per cent of total cycle length, the variation of the ovulatory day was from 19.2 to 31.0.

Ovulation potential: The non-ovulatory potential averaged 3.31 mv. while the average ovulation potential was 10.77. Expressed in per cent increase, the potential at ovulation was 325 per cent above the average milli-voltage. The direction of voltage varied constantly from plus to minus and the ovulatory potentials likewise went in either direction. The data on this subject cover a month less time because when she lost her job she left the experiment.

Pulse rate: The average pulse rate was 71. The high readings averaged 88.5 and the low 57.5. The high readings usually were found at the end of the cycle and before the beginning of

the next. The low readings did not show any cyclic tendency.

Basal rectal temperature: Although a satisfactory difference between high and low temperature was found in some cases, no typical cyclic temperature curve could be established in this subject. The low readings occurred between the 4th and 13th day, but the high readings did not consistently appear at any stage of the cycle. No explanation could be given for this fact except that from her vaginal smears it might be concluded that the hormone level was rather low. The regularity of her cycles despite severe emotional upsets points, however, to a remarkable stability of sex function.

Records on sleep, mood and activity: Quality and hours of sleep did not deviate from the normal. The record of hours of sleep must be commented upon because it does not indicate the frequent interruptions caused by the crying children for which the subject had to care. No sleeplessness of cyclic character could be found.

Short abdominal discomfort was reported at the onset of menstruation. Backache and tired feeling preceded that period. Breast changes occurred during the end of the cycle and discharge prevailed during the ovulatory and post-ovulatory stages, but was never extreme.

Mental activity tended to increase rapidly after an initial drop at the beginning of menstruation. Physical activity followed generally the same pattern, although it usually preceded the rise in mental activity by a day. High activity was reported for the premenstrual days.

On account of a very specific order of events, conclusions as to the occurrence of cyclic changes in tension, worry and irritability could be drawn only with great difficulty. Peaks in these emotions were reached toward the end of a cycle in January when the subject decided that she could not bear the close confinement connected with her job. Toward the end of the month, after the decision to leave her job had been reached, questionable reports of calm were repeatedly given, although the experimenter was convinced of the presence of emotional upset. It was, however, certain that the subject mastered her emotions to a high degree and appeared perfectly balanced at the interviews during a whole cycle until she left the experiment.

Elations and depressions correspond with the picture of emotions previously mentioned and it was not possible to see clear cyclic changes in their appearance.

SUBJECT 60

This subject, aged 22, from an intellectual family, is tall and well-developed. She lives in very close mental contact with her mother and is reserved about her own life. Her sex type appears normal. She belongs to the youngest age group, but appears older, perhaps because she takes a serious, responsible attitude toward life. Her job makes her responsible for the welfare of a small baby, and her experience with a previous baby has cautioned her not to get too much attached to the child because it will later be taken away from her. This seeming economy of emotion may contribute to her good balance.

Menstrual cycles: This subject was selected for study with some hesitation because she did not appear to have a normal menstrual cycle when the experiment started. Her willingness to cooperate, however, and the opportunity to observe a deviant case caused the experimenter to include her. She has had irregular, deficient menstruation for years and has been under treatment and supervision by a physician

for a long time. This endocrine specialist had used gonadogen to enforce her menstrual cycles for 6 weeks before the experiment started. While working in Ithaca she received the hormone from her physician by mail and had received an intravenous injection of 60 i. u. of gonadogen on the 19th day of her cycle, 11 days after she had become a subject. Ten days afterwards she began to menstruate, and thereafter completed four more regular cycles during the course of the experiment. The remarkable fact in this case is that she continued the following cycles without any further use of hormone therapy. From October to the middle of March she received only one injection of the hormone. This induced bleeding and she then apparently returned to her normal cyclic activity. Her cycles varied between 25 and 48 days. The tendency for long cycles might have suggested hormonal abnormality, but the duration as well as the amount of flow did not deviate from the normal. The possible day of ovulation determined electrically and by smear coincided perfectly. Ovulation varied from the 11th to the 23rd day.

The picture of the vaginal smears revealed a cycle of unusually high estrogenic activity. Cornification was present at all times in the cycle, although the highest possible cornification and spreading was reached at a time when ovulation could have occurred, according to the other criteria. Absence of impurities was also characteristic of the smear at almost all stages.

With the hematoxylin-eosin and waterblue stain (Papanicolaou, *10*) it was not possible to see clearly the day to day changes that might underlie such a picture of gross cornification. For this purpose Shorr's new quadruple staining method was used and revealed slight changes suggestive of a cycle.

Ovulation potentials: The average non-ovulatory potential in this subject amounted to 4.05 mv., varying from 3.70 to 4.98. The ovulatory potential averaged 12.7 mv. The increase of the latter over the former was 342 per cent. The direction of the potential varied as in most other cases.

Pulse rate: The pulse rate averaged 76.1 with low rates averaging 65.5; and the high rates 92.5. No correlation between sexual phase and extreme pulse rates could be found.

Basal rectal temperature: A very clear relation between basal rectal temperature and the sex cycle was found. The difference between high and low temperature was 1.2° to 1.8° F. The high temperature day occurred definitely at the end of the sex cycle while the low temperature day closely preceded the ovulatory days. It is interesting that, although two of the criteria for ovulation were well in line and clear-cut, the peculiar permanent high estrogen effect in the smear picture might lead one to doubt the actual occurrence of ovulation.

Records on sleep, mood and activity: The subject usually secured sufficient sleep with the exception of the time toward the end of the first term in January when she was overburdened with reports for course work. The quality of sleep, according to her report, declined before menstruation but otherwise was normal.

Mental and physical activity frequently showed different trends, physical activity staying low while mental activity climbed. Physical activity showed nevertheless an enormous rise during the premenstrual days, and the urge to do otherwise unwanted housework (cleaning) increased. Since the subject lived in a college building and most of her duties were concerned with teaching, her capacity for physical activity was not subjected to a very severe test. Fatigue was a considerable

factor in this subject's life, and it was observed that it originated in mental more than in physical exertion. The fact that she stayed at her place of employment day and night might have led to lack of recreation and to boredom.

The record of mental state showed a remarkable absence of irritability and few periods of tension and worry. It would be impossible to draw clear conclusions from the few data available. Difficulties arose with the recording of elations and depressions because the subject maintained that she experienced elations and depressions at the same time. Events connected with her job or with her college successes seemed to have caused most of the minor variations in mood.

Quite a considerable effect upon the mental state of this subject was exerted by the return of her normal menstrual functions, as well as by the discovery of her ovulation day. The reaction of this serious-minded person to the discovery of her ovulation day was quite surprising. This subject rejoiced in the fact that she had a high potential and followed her own records with the greatest concern. We found it tempting to suppose that her interest in the event of ovulation which formed the focus of our experiments might be playing a rôle in the recurrence of normal cyclic variations. For years she had held the depressing belief that something about her menstrual cycle was abnormal, and shortly after joining the experiment she found herself in the line-up of normally functioning women. From available evidence it cannot be proven whether hormonal therapy or some therapeutic effect derived from participation in the experiment was responsible for her progress toward normal menstrual function. The reactions of the other, normal, subjects toward their own event of ovulation were quite similar, *i.e.*, all of them showed a remarkable satisfaction in being "functional." The same trend was observed frequently when women from all levels of life, in visiting the laboratory, had their fingertip potentials taken and discovered that they had ovulatory readings.

SUBJECT 64

Subject 64, aged 22, is tall, well-built, unusually healthy, strong, and from a normal family with many siblings all very athletic and healthy. Her reports are uncomplicated. She has no particular preference for deep-going research or theoretical school work and likes the practical side of life. She had served in preliminary experiments of this kind, and had already proven to be a cooperative subject with well-balanced attitudes.

Menstrual cycles: Six complete cycles were observed in this subject. The cycle length varied between 24 and 28 days, and had, according to the subject, been for years within those limits. Bleeding lasted regularly four to five days and was usually initiated by discomfort, pain or cramps. The day of ovulation in the respective cycles was determined not without difficulties but showed in four out of six cases complete agreement between electrical and smear evidence. The vaginal smear test showed good cyclic changes although the stages of cornification reached were far less clear-cut than in some subjects. The smears also showed evidence of a second increase in estrogenic activity toward the end of the cycle, which fits in well with the literature on urinary estrogen (*6*) in relation to the mental state. (*4*) The second peak was considered weaker than the first one.

Ovulation potentials: The average non-ovulatory potential was 3.18 mv. while the ovulatory readings averaged 10.64 mv. The ovulation day varied between the 8th and the 12th. The ovulatory potential readings were considered ran-

dom samples of an ovulatory plateau which extended over 24 to 48 hours in this subject. All the elevated readings were negative. During the test period there were several instances of wound potentials due to the treatment of a wart on the index finger. Another period of higher readings occurred frequently at the first day of menstruation but this elevation did not reach the ovulatory level.

Pulse rate: The average pulse rate per cycle varied from 86.3 to 93.8. It was observed that this subject, who was teaching classes for the first time, would have a high pulse rate before teaching started. The average of her high pulse rates was 103, and of her low ones 81. The low pulse readings occurred mainly during the first half of the cycle, up to the 11th day. The high readings, as mentioned before, were independent of the cycle.

Basal rectal temperature: A good cyclic temperature curve was obtained from this subject. The low readings preceded ovulation and the high readings preceded menstruation regularly.

Records on sleep, mood and activity: Most of the time the subject stayed below par in hours of sleep, although she managed to remain energetic with the exception of the last week in January and the beginning of February during a particularly busy time in college. The quality of sleep was reported to be fair, and no cyclic occurrence of sleeplessness was recorded. Disturbances during the night by two roommates coming home at late hours were frequent.

She was greatly stimulated by her admission to the local aviation school. Flying necessitated very early rising. Moreover, she was regularly serving as subject in an experiment conducted during the lunch hour. She managed, despite all the tests in which she was involved, to remain rather unconcerned and unchanged in her habits of life. For a short period she went through a crisis but succeeded in balancing her emotions. Sex factors did not seem to play a major part in her emotional life.

Physical and mental activity showed normal fluctuations with a high before the onset and a low at the beginning of menstruation. Although elations were very frequent and strong none was reported during the first days of menstruation. Depressions occurred in only two cases, both times at the premenstrual period, but were of short duration. Fatigue was a rare factor in this subject's life, and appeared in medium degree only during the first premenstrual days.

Serious discomfort and pain were encountered regularly at the beginning of menstruation. Discharge was infrequent and scanty following ovulation. Breast changes regularly preceded menstruation by a week.

SUBJECT 68

This subject, aged 36, in the oldest age group and single, was thin, short and rather feminine in her sex type. Her parents were living. A factor that figured greatly in her emotions was her age which is unusual for an undergraduate. She managed, during the test period, to overcome a natural aversion for giving facts about her life, and cooperated willingly. A complete change in her attitude occurred during the week when she was in charge of a small baby in the practice apartment of the college. She forgot not only all her routine measurements, interviews and test periods during that week, but she appeared to the experimenter to be in a state of confusion.

Menstrual cycles: Six menstrual cycles were observed, five of which were complete. The variation in duration was very small (from 24 to 26 days). Bleeding lasted 4 days. Ovulation as determined by the electrical method oc-

curred between the 8th and 10th days. The smear evidence was less clear and coincided in only two cases with the electrical results. Constant leucocytic infiltration made the interpretation of her slides difficult. The records are deficient for the period in which she cared for the child, which occurred at the second half of the cycle.

Ovulation potential: The average non-ovulatory potential was 3.60 mv. with a variation from 2.79 to 4.50 mv. The average ovulatory potential was 7.88 mv. The increase factor of ovulatory to non-ovulatory was 218 per cent. The direction of the ovulatory potential was positive on three occasions and negative on three.

Pulse rate: The pulse rate averaged 79.2. The low rates averaged 66.7 and the high 91.8. The subject was greatly concerned about her health and inquired frequently whether a high pulse rate meant danger. No cyclic connections between either high or low pulse rate could be discovered.

Basal rectal temperature: Although this subject exhibited a temperature range of 1.2° F. during her cycles no very clear-cut temperature curve was obtained. The low temperature day preceded ovulation but had a considerable spread. The high temperature day occurred after ovulation but could not be considered consistent.

Records on sleep, mood and activity: The number of sleeping hours obtained by this subject was very variable. Although she was still an undergraduate and had no more work than the others she was either slower or more conscientious in her preparation. It apparently kept her awake long hours, although her frequent reports of only two or three hours of sleep were possibly exaggerated. A tendency to sleeplessness prevailed in the premenstrual phase. Elations occurred following ovulation and minor depressions premenstrually.

Discomfort and pain were reported at the onset of menstruation. Bleeding lasted 4 to 5 days.

SUBJECT 76

Subject 76, aged 26, is slender, medium size, nervous and soft-spoken, good natured and extremely intellectual. She is in the middle age group and single. She seems basically maternal, with a strong urge toward religious activity. She is very little concerned about herself.

Menstrual cycles: Five complete menstrual cycles were observed, the length of which varied from 34 to 39 days. Bleeding lasted 5 to 6 days. Ovulation could be detected only with great difficulty. In only two cases was there agreement between the electrical and smear methods as to the day of ovulation. A moderate ovarian activity could be recognized in the smear. Leucocytes prevailed at all times. Ovulatory bleeding was recognized once in the smear.

Ovulation potentials: The non-ovulatory potential averaged 3.72 mv. with variation between 2.8 and 4.8 mv. The average of the four assumed ovulations was 8.9, with a variation between 7 and 10.7 mv. The increase of the ovulatory potential was 239 per cent of the non-ovulatory potential. The day of ovulation varied greatly, from the 6th to the 22nd.

Pulse rate: Her pulse rate averaged 67.4 and was at times very low. The average of the lows was 57.6, of her highs, 78.4. No cyclic appearance of extreme pulse rates was found.

Basal rectal temperature: The rectal temperature did not provide a clear picture of the sex cycle in this subject, although the temperature differences were considerable. There was no definite low before ovulation, or definite high in the premenstrual period. The difficulties in getting a satisfactory temperature reading, combined with a weak

cyclic expression in the smear, and the doubtful results of the electrical evidence, do not justify definite conclusions concerning the occurrence of ovulation.

Records on sleep, mood and activity: A very uniform routine of life provided enough sleep for this subject at most times. Nevertheless there was considerable variation in the quality of her sleep which is not traceable to the sex cycle. Poor sleep before the onset of menstruation occurred sometimes but not consistently. Spending most of her time, including the evening hours, in research work, she appeared to enjoy herself most during her religious activities on Sundays.

Very little breast change, discomfort, or pain were reported, but a slight discharge occurred at varying times during the cycles.

Few worries or depressions were reported. Tension sometimes increased moderately, but only one instance of severe irritability and tendency to cry was reported during the test period. This happened to be a day of onset of menstruation.

Mental and physical activity usually coordinated in this subject with the exception of the period before her qualifying examinations. Elations did not show a clear cyclic appearance and no extreme emotions were reported. The whole picture of her mental fluctuations of activity and mood seemed to fit well into the picture of moderate hormone fluctuations as revealed by the tests.

Conclusion

The purpose of this study is to contribute data derived from a careful daily study of ten women and concerned with the physiological and mental aspects of their menstrual cycles. The authors agree fully with the aim of Landis and collaborators (*8*) when they say "We have not tried to prove anything but have presented facts and their relationships to serve as base-line data for future investigations in this field of psychobiology."

In dealing with disorders of the sex cycle clinicians will benefit from fuller information about the variations in the physical and mental manifestations of the sex cycle to be expected in ordinarily healthy women, that is, women who are able to carry on their usual activities.

Recent advances in endocrinology have supplied physicians with potent endocrine preparations which can radically modify the sex cycle of the patient. The problem, however, is exceedingly complicated if one considers the patient's mental life. In discussing problems of the menopause Shorr (*17*), says, "There is growing awareness that the sexual drive is grounded in more fundamental factors and that the concept that it was solely dependent on the reproductive secretions was an oversimplification of an extremely complex and subtle reaction."

The authors are aware that many psychiatrists are of the opinion that the psychological material uncovered by psychoanalysis is not encountered in the ordinary medical interview. Nevertheless, the physician in daily practice carefully considers such indications of mood, sense of well-being, etc., as the patient is able to communicate. Through intimate daily association in the course of this study we sought to learn from our subjects such information as they were willing to volunteer. As the subjects' confidence in us increased and their interest in the physical aspects of the study became keener their reports of attitudes, moods, emotions, etc., became less conventional and perfunctory. The psychological observations here reported, and as far as possible couched in non-technical language represent the "ups and downs" of a group of women perfectly capable of

managing their own lives without the help of outsiders. It is believed that records from such a random group will be of value for the study of pathological cases as well as for the many border-line cases with which the social worker or the clinician has to deal.

Summary

Ten mature college women, ranging in age from 22 to 36 years, were observed during a total of 55 menstrual cycles, covering a period of five months.

The length of the cycles varied from 23 to 61 days. The average cycle length was 29.6 days. On the average the event of ovulation as determined by the electrical method occurred on the 11.8th day of the cycle with a variation from the 5th to the 23rd day. Even for the same individual there was very rarely a repetition of the spacing of ovulation in consecutive cycles, a variation from the 5th to the 16th day being no exception. The averages of the non-ovulatory potentials ranged from 3.17 to 4.05 mv. in the subjects, while the potentials at the time of ovulation averaged from 7.88 to 16.28 mv. The cyclic changes in the vaginal smear gave positive confirmation of the ovulation as determined by the electrical method in 85 per cent of the cases. The evidence for ovulation from the curve of basal rectal temperature coincided with the electrical evidence for ovulation in 58 per cent of the cases. The pulse rate showed no significant cyclic fluctuations. Cycles with apparently normal menstruation, but in which ovulation could not be detected with the electrical, vaginal smear and temperature methods, occurred in 11 per cent of the cases.

Psychobiological observations revealed, as the most universal and conspicuous reaction, an outburst of physical and mental activity before the onset of menstruation, coupled with high tension and irritability and preceded or accompanied by depressions. Another high in activity was discovered to dominate the ovulative phase of the cycle, but this type of activity was free from nervous tension and generally bore the character of an elation.

The authors acknowledge their indebtedness to the ten volunteer women whose confidence and cooperation made this study possible, and to Dr. H. S. Liddell who suggested this study and whose stimulating interest and helpful criticism continued throughout the experiment.

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GOAL, MECHANISM AND INTEGRATIVE FIELD

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I. A BIOLOGICAL PROBLEM

GOAL-DIRECTED CHARACTER OF WISHES AND DRIVES

THE AIM OF PSYCHOANALYSIS is the study of human motives. A motive is a concept that implies striving toward a goal. Everyone knows that rational behavior has a purposive goal-seeking character. Psychoanalysis has demonstrated that irrational behavior also is striving, though less succesfully, toward the fulfillment of wishes.

We attempt to understand a person's motives by relating them to other motives. The goals of behavior stand to each other in the relation of means to an end. We trace the chain of motivation back from the subsidiary goal, from the means, to the end goal. In this way we arrive at motives or goals that are more or less universal, not only for human beings but for other animals as well. These we call biological needs or drives.

Thus study of human motives leads us inevitably to problems concerning the adaptive character of biological phenomena. The goals that we seek in our conscious, rationally motivated behavior seem to be derived ultimately from biological needs, from goals that antedated our intelligence, from goals that we inherited, that were somehow inherent in the germ plasm from which we developed.

This method of explaining behavior has been subject to abuses. At all stages in the development of psychoanalytic theory we have too often fallen into the loose habit of explaining behavior by referring it back to some biological goal which we assume to be primary. We content ourselves with explaining a patient's neurosis as a manifestation of oral eroticism, or of eros or the death instinct or of a need for dependence, a biologically founded receptive tendency. Too often we do not even bother to inquire why or under just what circumstances this particular individual needs to be dependent or craves stimulation of his oral mucous membrane or wishes to destroy. We speak as though we thought that these so-called biological tendencies were operating continuously as primary causes, as though all that we needed to do in order to explain behavior were to refer back to one of these primary causes.

Unfortunately, this loose mode of thinking explains everything so easily that the explanation is worthless. If every kind of neurotic behavior is a manifestation of the death instinct, then we really do not know much more than we did before about the motivation of a particular patient's neurosis. No theory of the drives can be of much value unless it can give us some idea of the specific conditions upon which the activity of each drive depends.

It is evident, therefore, that even the concept of the biological drive is inadequate if we think of the drive itself as a primary cause and do not attempt to define accurately the conditions that call it into activity. If we consider the problem carefully we must realize that

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an adequate definition of a motive or drive must contain at least three parts: 1) A definition of the conditions that call it into activity, 2) a statement of its goal, *i.e.* of the conditions that will satisfy it, that will temporarily or permanently put an end to its activity, and 3) an analysis of the adaptive mechanisms by means of which the organism strives to achieve this goal and of the limitations which those mechanisms impose upon its ability to reach its goal.

If we attempt to answer these three questions, it soon becomes evident that the drives cannot be regarded as primary causes at all, that analysis of the drives leads us back still further to more general adaptive principles that guided and themselves were determined by the process of evolution of the species. In the present study, I shall attempt to contribute to our understanding of these relations by reviewing and analyzing what we know about the mechanisms of goal-directed activity in general.

A FEW DEFINITIONS

The terms biological need, drive, instinct, have been defined in many different ways and there is as yet no generally accepted convention as to their meaning. In order to avoid useless controversy over what is after all merely a matter of definition of terms, I wish at the outset to define them in the sense in which I propose to use them in this discussion and also to state briefly my motives for so doing.

I start from the empirically observed fact that human beings and other animals under widely varying conditions and by widely varying means behave in such a way as to achieve certain ends. This is true not only of animals whose hereditary pattern of behavior is relatively fixed, but also of those like the human being whose behavior is in large part a matter of acquired habit. Although we know relatively little concerning the exact mechanisms involved, it is therefore evident that even in the case of the most flexible behavior the universal goals toward which it tends must in some way have antedated and guided the learning of the particular habits by means of which that goal is achieved and must therefore in ultimate analysis be part of a hereditary pattern. I therefore define a drive as a hereditary tendency to learn habits[1] that tend to achieve a certain end. I also make use of an old distinction between instinct and drive, using instinct to designate relatively fixed inherited reaction patterns and drives to refer to those more flexible hereditary patterns whose influence is exerted by serving as a guide to the learning process.

My motives for defining drive in this way are three:

1) A first prerequisite of a good scientific terminology is that it should properly reflect our ignorance. We know relatively little about the mechanisms of goal-directed behavior and the object of this discussion is to inquire into them. Therefore, in order to avoid prejudicing the discussion I wish to define wishes and drives in terms that imply nothing as to their mechanism.

2) We also do not know just what rôle consciousness plays in goal-directed behavior, and indeed it is often difficult to determine in a given instance whether or not an animal is conscious of its goal. I therefore wish to define wishes and drives in terms that also imply nothing as to the state of the animal's consciousness[2] concerning them.

3) We know that goal-directed behavior is merely one manifestation and probably phylogenetically the latest manifestation of the regulatory or

[1] See page 234.
[2] See page 233.

adaptive principle in biology. In this sense an animal's search for food is just another manifestation of the same regulatory principle that is evidenced in the tendency of the acorn to grow into an oak tree. I wish to discuss motivation in terms that do not destroy our realization of this continuity. I therefore group all goal-directed tendencies together and distinguish only the parts of the integrating mechanism that are learned in the life-time of the individual from those that are inherited.

Of course I intend no implication as to what is the inherited nucleus of any particular goal-directed striving. In other words we are not yet able to enumerate the drives or to describe them accurately. This is still a task for experimental investigation.

RESISTANCE AGAINST FINALISTIC CONCEPTS

I am aware of course that there is a wide-spread resistance among biologists and psychologists against attempting in this way to trace back behavior to inherited "goals that are somehow inherent in the germ plasm." Indeed I believe that much of the current confusion in our thinking about the influence of heredity upon behavior springs from the fact that we are disturbed by the finalistic implications of the drive concept. We resist thinking clearly about the drives because we have conflicting emotions about their goal-directed character. As scientists we shy away from such concepts. They remind us too much of animistic and theological explanations of the universe and seem to distract us from the real task of science. Our aim as scientists is to understand the world in terms of cause and effect, in terms of uniform sequences. To speak in terms of wishes, purposes, biological drives—this seems to be a lapse from the discipline of strictly mechanistic thinking.

The far-reaching adaptive character of biological phenomena has impressed men throughout the ages and has led to concepts of a directing intelligence that shapes living beings according to a preconceived scheme or plan. As we know, views of this sort have been a serious obstacle in the way of scientific investigation, because of the implication that usually went with them that one must not question the divine intelligence by inquiring further into the mechanism of these adaptive reactions.

In view of the century-long and bitter struggle between science and theology over this point, it is of course not strange that there should be a strong urge among psychologists as well as biologists to get rid of finalistic concepts altogether. From this source springs the widespread resistance against the notion of biological drives in the sense that we have just been using it, as inherited goals of behavior.

Natural as is this wish to get rid of finalistic concepts, I doubt very much if any biologist or psychologist has ever yet succeeded in carrying out such a program. The difficulty of thinking in strictly non-finalistic terms becomes apparent when we consider how many essential biological concepts have finalistic implications. The notion of biological function is of course a purely finalistic one. It is possible to discuss the mechanisms of a machine in quite mechanistic terms; but even our discussion of the mechanisms of a machine would lose all point and meaning if we should forget the purpose for which the machine is designed. In inquiring into the mechanisms of an automobile we are interested not in just any physico-chemical relations between its parts, but rather in the mechanisms that make it run, that enable it to serve as a means of locomotion. In a similar sense we speak of the functions of the different parts of an animal organism. We could

speak in exactly the same sense of the functions of different parts of a machine. We wish in each case to understand the mechanism upon which depends the ability of the part or organ to perform its function, to fulfill its purpose in the total economy of the organism.

Equally important are the often unrecognized but unavoidable finalistic implications in our descriptions of behavior. When we say that a child reaches out and grasps an object, we do not describe geometrically what path his hand takes or physiologically just what is the pattern of muscular contractions involved in this act. On the contrary, we describe the act in terms of its goal which is to hold the object in the hand. Reaching and grasping are goal-directed activities. For the most part the units of behavior are goal-directed acts. For an understanding of the child's behavior, the exact path which his hand takes or the detailed pattern of muscular contractions involved is usually quite irrelevant. To ignore the goal of the child's act would be only to make his behavior quite unintelligible.

THE MECHANISM OF GOAL-DIRECTED STRIVINGS

Much of our conflict concerning the use of finalistic concepts in our scientific thinking springs from the false assumption that finalistic and mechanistic thinking are necessarily antagonistic to each other. That this is not the case is proved by the analogy to which we have already referred and which has been so very useful in physiology—the analogy between the animal organism and a machine. A machine also has a function but that does not prevent us from inquiring in detail into the mechanisms by means of which that function is performed. To make just such an inquiry into the mechanisms of goal-directed behavior is indeed the aim of the present study.

To this one might object that, in the case of the machine, the goal is imposed from without. It is the driver, not the automobile that wishes to move from one place to another, and it was not the automobile itself but human hands that built it for that purpose. In the case of the animal organism, however, the goal-directed striving seems to arise from within the organism itself. In the animal organism, therefore, we have a somewhat more complex problem. In the case of the organism we must try to understand not only how the machine works, but also how it got its design. What are the source and genesis of the goals toward which the organism seems to be striving?

In the present state of our knowledge of course, we are not able to answer questions of this sort. It is interesting that all of our attempts so far to account for the genesis of goal-directed strivings lead us back to pre-existent goal-directed strivings whose mechanisms are not yet clear. Learning, as we shall see,[3] usually implies a pre-existent wish or drive as its incentive. On the other hand, the principles of natural and sexual selection[4] take for granted the fact of heredity. Heredity itself is obviously a phenomenon comparable to the most highly adaptive goal-seeking behavior. That the developing germ cell finally arrives at a form and dynamic character so closely resembling that of the parent organism is a fact that can obviously not be just taken for granted. It is evident also that the chain of events that is set in motion by the genes and cytoplasm of the germ cell is not a fixed and unalterable sequence of cause and effect. It would seem rather that development must take place under the influence of flexible directing

[3] See page 232.
[4] See page 233.

mechanisms similar to the drives—mechanisms that tend toward final states of equilibrium that are relatively fixed even though under varying circumstances the route by which the final equilibrium is reached may vary widely. A general in giving orders for a military operation cannot prescribe in detail what his subordinate generals shall do, but must give them objectives or goals which they are expected to achieve by whatever means unpredictable circumstances may dictate. The development of the organism must be thought of in similar terms. Experimental embryological studies have demonstrated that in the very earliest stages of embryological development, even such drastic interference as the removal of half of the egg will not prevent the development of a normal organism. Later there develop more circumscribed embryological fields each with its own particular goal of development; but even the removal of large parts of a limb field, for example, will not prevent the development of a normal limb unless the mutilation occurs after the limb field has itself become differentiated into a number of still more circumscribed fields.[5]

The obvious analogy for regulatory phenomena of this sort would be a physico-chemical system that tends toward an equilibrium that remains the same regardless of the starting point or of the route by which the equilibrium is finally reached. Such a tendency to equilibrium may depend upon the universality of certain forces as in the case of the tendency of water almost inevitably to find its way to the ocean. In other cases the final state of equilibrium is dependent on a high degree of organization which is peculiar to the particular physico-chemical system. It is evident that the equilibria toward which the goal-directed tendencies of living beings tend are of the latter sort, comparable to the mechanisms of a complex machine.

For many years Koehler (*16*, *19*) has been attempting by means of psychological experiments to form some idea of the nature of the physico-chemical systems that determine the nature of psychological fields. He has also (*18*) pointed out analogies between psychological and embryological fields from this point of view. Experimental embryologists are also attempting to work out the physico-chemical mechanisms responsible for the formation and influence of the embryological fields; and the new science of physiological genetics is attempting to trace in detail the mechanisms by which the inherited potentialities of the germ plasm influence the actual course of development. It is undoubtedly along these lines that we must hope for the final solution of problems concerning the nature and genesis of goal-directed strivings.

In the present study, however, we wish to attack only one small part of this problem. Our present aim is to attempt a dynamic analysis of the organization of goal-directed behavior in general.

II. Organization of Goal-Directed Behavior[6]

Pseudo-mechanical concepts

At the present time it is customary to

[5] For an excellent summary of this work see Paul Weiss, (*30*).

[6] The following description of the organization of purposive behavior parallels very closely analyses by E. C. Tolman (*28*) and by Henry Murray (*24*). I shall not take time to discuss the rather slight differences between my views and theirs, but shall merely state that Tolman's book is a beautiful analysis of the experimental evidence concerning the mechanisms of purposive behavior, whereas Murray's and his coworkers' analysis is based upon exhaustive clinical attempts to find a method of describing personality adequately. It should also be obvious to any reader who is familiar with the work of Kurt Lewin and his coworkers (for example Lewin, *22*, *23*) how extensively I have made use of his method of analyzing goal-directed behavior by reference to the psychological field. My views differ from his chiefly in one point which will be discussed immediately.

simplify these problems for ourselves by thinking of goal-directed strivings in pseudo-mechanical terms. We attempt to understand wishes and purposes upon the analogy of a mechanical force, as though the goal were like the pole of a magnet exerting a direct attraction upon the individual.

Only a little reflection, however, is necessary to convince us that this is not a trustworthy analogy.[7] In the first place, the success of a goal-directed striving depends upon one's *knowing how* to achieve one's goal. In order to overcome an obstacle in the way of a physical force it is merely necessary to increase the intensity of the force. In order to find satisfaction for a wish, on the other hand, it is necessary to know how the goal is to be reached. No increase in the intensity of the need or of the energy that can be released in the pursuit of a psychological goal will be of any avail unless there is this knowledge of how the energy must be applied.

In the second place, in order to achieve a purpose, it is necessary to subordinate one's motor energies to just the kind of activity that is needed. It is difficult to teach a small and active child how to tie a bow-knot. The child has too great a motor urge which can be satisfied only by grosser movements. The finer movements necessary in order to tie the knot require restraint, a capacity to inhibit this urge toward gross motor discharge. It is precisely this restraint of which the child is not yet capable.

It is evident, therefore, that it is misleading to think of a wish as a simple force, tending toward fulfillment, that requires no further analysis. The efforts of an organism to fulfill a wish involve a complex process of integration. The subordination of behavior to purpose requires a complex machinery and a highly organized mechanism of dynamic control.

HIERARCHY OF GOALS—COGNITIVE FIELD AND EXECUTIVE TASK

The nature of the dynamic organization necessary for goal-directed striving seems most transparent in the case of conscious rational behavior. Upon even the most superficial analysis, our deliberate purposive behavior resolves itself into a whole system or hierarchy of goal-directed acts that stand to each other in the relation of end and means. Knowing how to achieve a goal is first of all a matter of resolving the task of reaching the goal into a number of simpler goal-directed acts which serve as means toward the attainment of the original goal. The desire for the end goal successively activates efforts directed toward subsidiary goals. A mother wishes for example, to feed her child. In her desire to satisfy the child's hunger she goes to the store, buys food, brings it home and cooks it, calls the child and finally feeds it. Each of these successive activities is itself a goal-directed act which in process of its execution must itself be resolved into a series of still simpler goal-directed acts.

It is evident further that the end goal, the desire to feed the child, must not only activate the several subsidiary goals, but must also time them in rela-

[7] Considerations in many respects similar to those here presented have already been discussed by Tolman in a criticism of Lewin's vector concept (Tolman, 29). Lewin (21) replied by emphasizing the fact that the forces that he postulates must be understood as acting in a psychological (cognitive) field rather than in physical space and that Tolman's objections could all be met by paying careful attention to the way that the experimental situation must appear in the eyes of the experimental subject. On the other hand Lewin feels that it is better not to attempt to speculate concerning the "mechanisms behind the psychological field." The writer of the present article is very much in sympathy with Lewin's efforts to base dynamic analyses of behavior upon an accurate reconstruction of the individual's cognitive field. He feels, however, that the severe frustration reactions encountered in psychopathology cannot be adequately understood without attempting to analyze "the mechanisms behind the psychological field."

tion to each other and to the total situation. All this takes place under the directing influence of a cognitive field. This cognitive field must itself first be created before it can exert its directing influence. This takes place usually under the impelling force of the original goal-directed striving. One begins to consider by what means one's wish can be satisfied. If we are successful in finding adequate means to reach our goal, we say that we *know how* to achieve it.

Thus the problem as to how behavior is subordinated to a goal-directed striving resolves itself into two parts—one cognitive, the other executive. We must inquire first how the goal-directed striving builds up its cognitive field and second by what means one is able, under the guidance of the cognitive field, to direct one's motor energies to just the kind of activity that is needed.

GENESIS OF COGNITIVE FIELD

Just how does a goal-directed striving build up its cognitive field? How does one find out how one's goal is to be achieved?

As we know, there are two possible answers to this question. One's practical knowledge of how a goal can be reached may be based upon what one has learned from previous experience or it may be based upon some inherited capacity that did not need to be learned.

The process of learning has been the subject of most extensive investigation. Pavlov (*25*) and others have attempted to reduce it to its simplest terms in their investigations of conditioned reflexes. According to Pavlov, a conditioned stimulus—the sound of a metronome, for example—acquires the reflex properties of the unconditioned stimulus that immediately follows it (for example, the taste of food in the dog's mouth). This formula, however, does not fit the usual case in which the animal is learning how to reach a goal. The acts that enable an animal to reach food are not the same as those provoked by the taste of food in its mouth. It is obvious that Pavlov's original formulation does not fit this sort of learning.[8] The facts would seem rather to correspond to the more popular formula of common-sense psychology that it is those motor reactions that lead to the satisfaction of a drive or wish that tend to become positively conditioned. This principle has been called by Thorndike (*26*) the law of effect.

We note now, however, that this common-sense formulation already implies a pre-existent goal-directed striving, a wish or a drive. In view of this fact, it would seem to simplify matters to follow the suggestion of the Gestalt school of psychology in regarding the process of conditioning as merely the most elementary example of the process of building up a cognitive field.[9] The cry of an infant, for example, is followed by the satisfaction of its hunger. After this has happened once or several times, the infant integrates crying and the satisfaction of its hunger into a single cognitive field. The infant has gained a new insight. It has learned how to get food by crying for it. At a later time this knowledge can be utilized when the infant again desires food. This interpretation of conditioning as a process of gaining a new insight receives confirmation from the fact that knowledge acquired during the pursuit of one goal may also be utilized in learning

[8] Hull and his co-workers (*14, 15*) are actively engaged in the task of attempting to understand goal-directed behavior in terms of a complex system of inter-acting conditioned reflexes. I also once attempted to construct such a system (French, *2*). In the present discussion, however, I have tried to avoid these intricate problems.

[9] E. C. Tolman (*28*) carefully analyzes the experimental evidence that proves that the concept of formation of new cognitive fields is more adequate than Thorndike's law of effect to explain the relevant facts.

how to reach quite another goal.[10] In the process of trying to find out how a new goal is to be reached, one must begin by orienting oneself as to one's present situation in relation to the goal and then proceed to piece together bits of knowledge that one may have acquired at various times and under various circumstances in order to build up a plan of how the new goal is to be reached.

Human experiments indicate that simple conditioning often takes place without the conscious knowledge of the subject. In other words, a cognitive field may be built up and later utilized in the guidance of behavior without the subject's ever having been conscious of it. This, of course, will not surprise psychoanalysts who are already familiar with phenomena that we are obliged to interpret as evidence of unconscious insight.

In our subsequent discussion, therefore, it will be of advantage to disregard the distinction between conscious and unconscious insight. By "cognitive field" or "practical insight" we mean a mechanism capable of registering and integrating stimuli in such a way as to make possible a more or less flexible adaptation to varying situations in order to achieve an end goal. A purely mechanical example would be a thermostat or a telephone dialing system; or we may turn to physiology and find examples in the mechanisms in the central nervous system for maintaining a constant body temperature, or for maintaining equilibrium in the upright position.

In general, we attempt to understand goal-directed behavior in terms of two factors. We try first to learn what a person wants, what is his goal, and then to determine what he knows about how to get it. Once we have some insight into what he wants, then by comparing what he does under varying circumstances, it is possible to infer what he knows and what he does not know about how to get it. Conversely if we know both the goal of his behavior and the content and limitations of his cognitive fields, then we should be able to predict rather precisely the range and flexibility of his adaptive responses to varying conditions.

As we have seen, however, the motives that guide our rational conscious behavior seem to be derived ultimately from biological needs, from goal-directed urges that we inherited. How did these biological drives acquire their apparent "knowledge" of how their goal is to be reached? The accepted biological theory concerning this point accounts most easily for those cases in which the adaptive response is a relatively fixed one. The theory of natural selection which originated with Darwin, points out that the needs which these adaptive responses serve are vital for the survival of the organism or of the species. The adaptive responses themselves, it is now believed, were hit upon by accident in the course of millions of successive chance mutations of the germ plasm; but only those responses which could best insure the survival of individual organism and race could be passed on to future generations.

In human behavior, however, fixed adaptive responses of this sort play a much less important rôle than in many other animals. For this reason we are accustomed to distinguish between these hereditarily fixed responses which we call instincts and other much more flexible goal-directed strivings which we call drives. In the case of these less fixed reactions, the biological need, at least in many cases, must exert its influence upon behavior through the learning process. We have already seen that learning usually implies, as incentive to learn, a pre-existent goal-directed striving, a wish or a drive. From

[10] See E. C. Tolman and C. H. Honzik (*27*).

this point of view a drive might be defined as a tendency to learn habits that are effective in relieving the tension of an underlying biological need; or, in still other words, we might define the drive as a tendency to build up cognitive fields[11] that facilitate the relief of such a tension.

From this it follows that the organization of a drive in relation to its goal consists of at least two parts: 1) a physiological tension more or less specific for the particular drive and 2) mechanisms that have been inherited or learned by means of which this tension can be relieved. We must assume for example that a new-born infant may be hungry without having any idea how its hunger is to be satisfied. The tension arising from its hunger is discharged in diffuse motor activity. Only the sucking movements of the lips give us a hint that the infant's tension is to be satisfied by taking something into the mouth. At first the infant knows only that it is uncomfortable. Before it can do anything purposive about it, it must first learn how to satisfy its hunger; it must learn more definitely what it wants and what to do in order to get it. Thus knowledge based upon experience tends to concentrate the diffuse motor restlessness of the child upon more sharply differentiated efforts to achieve a more circumscribed goal. The diffusely radiating excitation of the child's hunger (see Fig. 1-A) is supplemented perhaps by appetite for a particular food which concentrates the child's energies (Fig. 1-B) upon a particular plan for getting it and may perhaps also inhibit (Fig. 1-B inh.) other and disturbing manifestations of the child's restlessness.

FIGURE 1-A

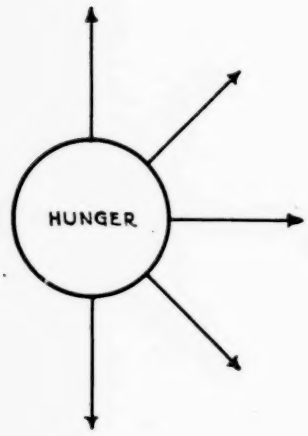
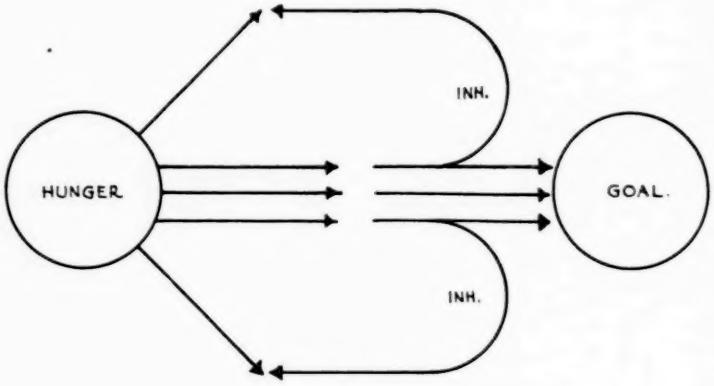


FIGURE 1-B



→ indicates tension and its direction.

THE EXECUTIVE TASK—SUBORDINATION OF BEHAVIOR TO PURPOSE

In order to get a more adequate picture of this process of concentration of energy upon more specific goals we must now turn to the study of the executive aspect of goal-directed behavior. We may gain some insight into the directive influence of the cognitive field by studying reactions to frustration.

When difficulties or obstacles are put in the way of a goal-directed striving, the task of overcoming these difficulties becomes at once a subsidiary

[11] See page 233.

goal. In order to reach the original goal it is necessary first to overcome the obstacle. In general there are two methods of getting past an obstacle: 1) One may remove or destroy it or 2) one may avoid the obstacle and attempt to get around it. In either case the energy of the original goal-directed striving must be concentrated upon this subsidiary task.

Concentration upon overcoming the obstacle is the type of reaction to an obstacle that involves the least modification of the original wish. One attacks the obstacle aggressively. In many cases there is a mobilization of new energy to attain the goal, in spite of the obstacle. The obstacle stimulates one to increased effort.

When the degree of obstruction is somewhat greater, the urge to avoid the obstacle becomes more important and it becomes necessary to deflect the energy of the original wish away from a direct approach to the goal. This *deflection* of energy to avoid the obstacle may occur in varying degrees. a) In some cases it is merely a question of getting around the obstacle. If one cannot achieve one's end by one means, one finds another means to accomplish the same purpose. A salesman who has failed to bully a customer into buying his goods may try next to win him by flattery. b) If it is impossible to get around the obstacle, the next step may be to modify the goal, to accept in place of the fulfillment of the original wish some substitute that is just as good or nearly so. If one cannot get meat, one contents oneself with fish.

DISINTEGRATION OF GOAL-SEEKING MECHANISMS

If the difficulties in the way of a goal-directed striving become insurmountable, the original end goal may lose its dominance and the subsidiary goals of overcoming or avoiding the obstacle may become ends in themselves. Examples of this sort of fixation upon a traumatic frustration are very numerous and indeed cover the whole field of psychopathology. In such reactions, flights from the frustrating memory and attempts at aggressive mastery of it are apt to alternate or to be condensed together in all sorts of combinations. A boy who has been frustrated by the mother's preference for an older brother may at one time turn away from women altogether. At other times he may turn his whole energy upon a competitive struggle with other men. This may go so far that women are valued only as a means of competition with men. Or a girl who has been jilted may become fixated upon the impulse to inflict similar humiliation upon men and may deprive herself thereby of the possibility of gratifying her original desire for love. Or instead of attempting to master her frustration by defiant or revengeful behavior, a neurotic girl may accept choking sensations or some other hysterical symptom as an unsatisfactory and unpleasant symbolic substitute for forbidden sexual wishes.

Thus in every psychopathological manifestation there is a disintegration of the goal-seeking mechanism. The goal-directed striving instead of successfully directing behavior toward a single purpose now loses its dominance. Goals that have previously played a subsidiary rôle as means to an end now escape from the dominance of the end goal and become ends in themselves. As a result, behavior becomes some sort of a confused resultant of the struggle for dominance between competing goals.

Neuroses and psychoses, as we know, are the products of psychic conflict. The disruptive influence of competing goals undermines still further the effective dominance of any one goal, and may lead to the most irrational and paradoxical behavior.

The distintegration of the goal-seeking mechanism may affect either its cognitive or its executive aspect, or both. In the cognitive sphere, we find evidence of this disintegration of the goal-seeking mechanism in the peculiar mode of elaboration of mental contents that is characteristic of the dream work and of the process of symptom formation in the neuroses. Freud (*6*) calls this the primary process. The primary process is one of the most striking manifestations of this disintegration of the organization for purposive behavior. In the work of symptom and dream formation, one gains the impression of a very free displacement of psychic energy from one mental content to another guided by the principle of avoiding painful and turning to pleasurable mental contents in apparently complete disregard of external reality and of logical or chronological relations. For our present purpose it is important to point out that whereas in rational thought the stream of thought is successfully subordinated to a goal concept, in the primary process the goal concept loses its dominance. This is what we mean when we speak of the disintegration of the goal-seeking mechanism. The disintegration in this case involves the thought processes, thus having to do with the cognitive step in the organization of purposive behavior.

In other cases, the disintegration involves predominantly the executive aspect of this process. Strong emotions, as we know, tend to undermine the capacity to subordinate one's motor energies to purposive activity. When one is very angry it is difficult to think clearly or to perform tasks that require great muscular precision.

STRUGGLE FOR DOMINANCE BETWEEN DIFFERENT GOALS

Thus analysis of reactions to frustration gives us a picture of subsidiary goal-directed strivings escaping from the dominance of the end goal. This would seem to be conclusive evidence for the fact that even in rational effective purposeful behavior, the integrative capacity of the dominant goal-directed striving is quantitatively limited. Each goal exerts its integrative influence through the medium of a cognitive field. Under the guiding direction of its cognitive field each goal strives toward its own end by activating or releasing subsidiary goal-directed strivings and inhibiting antagonistic goals. If a single goal maintains effective dominance, the subsidiary goals are activated and released according to schedule. If no single integrating goal can maintain its dominance, the conflict between competing goals gives rise to the cognitive confusion of the primary process and to the irrational and paradoxical behavior characteristic of neuroses and psychoses. Except in the most acute phases of a neurosis, however, a curative tendency, a tendency toward integration can also be noted. Freud (*13*) has called attention to the fact that the central function of the ego is to reconcile conflicting strivings. Out of this need for reconciliation arise new goals whose aim is to bring the two conflicting strivings into harmony with each other. A child whose forbidden impulses threaten it with loss of the parents' love will seek to win back the parent by confession; or the need to find a solution for an insoluble emotional conflict may find a displaced expression in a compulsive interest in solving philosophical problems.

III. Dynamic Analysis of Goal-Directed Behavior

PSYCHIC TENSION AND INTEGRATIVE CAPACITY

We might perhaps expect that the most intense wish would be the one most likely to attain dominance over

other goals. Paradoxically enough, however, the very intensity of a wish or of a need may make impossible effective efforts to satisfy it. In its desperate attempts at flight a chicken will often run in front of an automobile instead of away from it. In an experiment of Koehler's (*17*) a dog was unable to pull itself away from meat on the other side of the fence although it would have been quite possible to run around through a door in the rear to get it. Moreover, everyone has experienced how impatience or the need for hurry tend to paralyze one's capacity for application to painstaking effort.

We gain some insight into this apparent paradox if we recall that a biological need or drive implies a state of disturbed equilibrium or physiological unrest that tends first of all to be discharged in diffuse motor activity, and that this diffuse excitation is only later concentrated upon more circumscribed goals[12] as a result of knowledge gained from subsequent experience. Thus the original urge to escape an unpleasant tension is supplemented by an attraction to a more circumscribed goal that is desired also for its own sake. Hunger is supplemented by appetite. Under the polarizing influence of this compound craving, a cognitive field is built up which must then inhibit any disturbing remnant of the original tendency to diffuse motor discharge and must subordinate activity to the task in hand.

It is evident, therefore, that the capacity of a goal-directed striving to maintain its dominance depends first of all upon the ability of its cognitive field to inhibit and regulate the tendency of its own underlying tension to seek discharge in diffuse motor activity. This ability to withstand tension we may designate quantitatively as the *integrative capacity* of a goal-directed striving.

[12] See page 234, Figs. 1-A and 1-B.

PHANTASY, CONFIDENCE AND INTEGRATIVE CAPACITY

Our next problem will be to inquire into the dynamic sources of this integrative capacity of a cognitive field.

We gain some light upon this question by recalling the effectiveness of dreams or phantasies temporarily to quiet disturbing tensions. If we are in danger, we recall memories of how we once escaped from other dangers. If we are hungry, we dream of food.

Dreams and phantasies, however, are not permanently satisfying. There is a tendency for the disturbing tension to reassert itself. If one is to achieve more permanent relief, phantasy must be activated into purpose. This occurs apparently by a sort of fusion or synthesis of the satisfaction derived from phantasy with the tension of the original need. As a result of this synthesis[13] one becomes dissatisfied with mere phantasy. The phantasy takes on the partly unpleasant quality of an unsatisfied wish and one feels the need to strive for the realization of one's phantasies. On the other hand, just as a satisfying or

[13] Sometimes this synthesis fails to take place. The threatening tension may be too intense. One clings to the satisfying phantasy, struggling desperately to banish one's fear or pain; but then finally the disturbing tension becomes too strong and breaks through in some sort of emotional or motor discharge.

At other times a false synthesis takes place. One attempts to give a sort of reality to one's phantasies in symbolic acts. As Anna Freud (*5*) puts it, "denial by phantasy" is supplemented by "denial in word and act." Similarly neurotic characters must give reality value to their phantasies by "acting them out."

It is an interesting problem to inquire just what conditions are necessary in order that this synthesis between phantasy satisfaction and underlying tension may lead to the formation of a really effective purpose capable of inhibiting disturbing tensions and concentrating one's motor energies upon the task of achieving one's goal. Probably these conditions are of a quantitative nature. The cognitive field required for the formation of an effective purpose is more complex than the cognitive field required for "denial in word and act" or for the "acting out" of neurotic phantasies. The formation of an effective purpose should therefore require a greater potential integrative capacity.

reassuring phantasy has been able temporarily to quiet a disturbing tension, so now the hope of success in achieving one's purpose is able to diminish the tension of the underlying need[14] and its tendency to diffuse motor discharge.

It is this hope of success, which has all the satisfying value of a phantasy, that now is able to give the cognitive field[15] its integrative capacity. The knowledge of how to achieve one's goal now acquires the quality of hope and expectation of future satisfaction. The hope of achieving one's goal tends to concentrate the tendency to diffuse motor discharge upon more sharply defined efforts directed toward the goal. This hope also gives to one's plans the capacity to withstand antagonistic tensions. For the sake of realizing one's hope of success, one becomes willing to forego other satisfactions and to withstand the painful pressure of disturbing tensions.

Thus the intensity of a wish is not the only factor that affects its integrative capacity. Equally important is the factor of confidence in one's ability to achieve the goal. It is upon this principle that the war propaganda of which we hear so much today is striving continuously to undermine the enemy's confidence. One is much more ready to make sacrifices in order to attain a goal if one feels sure that one's efforts will meet with success, but by undermining confidence, one weakens the energy of the enemy's purpose. It is evident, therefore, that the effective integrative capacity of a goal-directed striving depends not only upon the intensity of one's desire but also upon one's confidence in the ability to achieve it.

Obviously the most objective basis for such confidence is the memory of previous success in achieving the same or similar goals. One makes a sort of intuitive estimate of the probability of success based upon one's previous experiences of success or failure. We all know, however, that one's expectations of success or failure are not so objective as this. Sometimes quite generalized moods[16] of optimism or pessimism result from success or failure in quite unrelated spheres or from endogenous physiological factors whose cause may not be easy to discover.

INTEGRATIVE CAPACITY AND INTEGRATIVE TASK

It is obvious that the success of a goal directed striving will depend not only upon its own integrative capacity, but also upon the state of readiness of the subsidiary goals that it must employ as means. Much depends therefore upon the question whether these subsidiary mechanisms are enjoyed for their own sake or whether they must be forced into activity by the central integrating field. In other words, we must consider not only the integrative capacity of a goal-directed striving, but also its integrative task.

We may illustrate these relations most clearly by reference to the phenomena of sublimation. Some boys love to build things. Such a boy later may find his work as a carpenter or an engineer quite fascinating, whereas another man might find the same work quite irksome. In the first case the work will require relatively little effort. In psycho-

[14] See French (*3*, *4*), Benedek (*1*).

[15] In discussing the cognitive field in its integrative executive function we shall refer to it as the "integrative field."

[16] Indeed the level of confidence once established may lead to a cyclical chain of causation. Confidence in the success of one's efforts within certain limits will enhance the effectiveness of one's efforts by increasing the capacity of the integrative field; but this in turn will tend to enhance the objective reasons for hope of success. On the other hand, expectation of failure may give rise to a vicious circle tending in the opposite direction. Which of the two cycles gain ascendary may be determined by a general mood level resulting from quite extraneous factors.

analytic terminology we should say that the work was highly erotized for him or that it had a high cathexis of psychic energy. In the second case the work will require much more effort and may be done only because it is necessary in order to earn a living. Under these circumstances the work will require much more effort. The man's purpose to earn a living will be faced with a much greater integrative task than in the case of the man who enjoys his work for its own sake.

We encounter a similar problem in relation to possible competing goals. If it is necessary to interrupt a child's play in order to get the child to do some task, much will depend on just how this is done. Sometimes it is possible to make the task interesting to the child. The child's active interest turns away from its play to the work it is being required to do. The little girl who has been playing house may be induced to feel that washing the dishes is merely a more interesting continuation of her play. In such a case the integrative task in this activity will be relatively light because the work is enjoyed for its own sake. If the mother's devices fail, however, and the work is felt as an interruption to the child's more interesting play, then the play remains as a competing goal and the child's integrative task in compelling herself to work will be much greater.

We have defined the integrative capacity of a goal-directed striving as the amount of tension it is able to withstand without showing signs of disintegration. Similarly we may define the integrative task of a goal-directed striving in quantitative terms as the amount of tension that its integrative field must withstand in order to subordinate behavior to its end goal. As we have seen, the goal-directed striving, acting through the medium of its cognitive or integrative[17] field must not only inhibit antagonistic strivings but must also activate one subsidiary goal after another, all in accordance with the time schedule of the cognitive field. The sum of the tensions arising out of antagonistic strivings plus the resistance of subsidiary goals to activation constitutes at any given moment the integrative task. If signs of disintegration of the goal-directed striving appear, we take this as a measure of its integrative capacity, as evidence that its integrative task is now in excess of its integrative capacity.

FUNCTIONAL READINESS AND FUNCTIONAL RELUCTANCE OF PHYSIOLOGICAL MECHANISMS

Not only subsidiary goals but also elementary physiological mechanisms differ widely as to their functional readiness for activation by a dominant goal-directed striving. In a state of health and rest, most functional activity is pleasurable. A healthy child loves to be active for the very joy of activity, has an eager interest in sensory impressions of all kinds, and its mind is continuously and spontaneously active with all sorts of questions. Activity is interesting for its own sake, quite independent of or in addition to one's interest in the particular goal toward which one is striving. If there is no task at hand, the child is eager to find something to do. In states of ill health or fatigue, on the other hand, one may find that it requires effort to be active and there may be a desire to withdraw from sensory stimuli which at other times would be experienced as pleasurable but which now imply an unwelcome spur to activity. In sleep this withdrawal from both activity and sensory stimulation is more or less complete.

It would seem reasonable, therefore, to regard these varying attitudes toward stimulation and activity as part

[17] See footnote 15.

of a system of mechanisms for the regulation of the level of functional activity in the various organs. An indispensable prerequisite for the possibility of adaptive or goal-directed behavior is the fact that the organism contains organs and physiological mechanisms that are equally available for many different purposes. It is the function of a muscle to contract but the contraction of any one muscle may form a part of the most varied patterns of contracting muscle groups and may be subordinated to goals of the most diverse kinds. The same muscle may help one moment to build something, another moment to destroy it. All depends upon the total pattern of innervation to which its functional activity is subordinated.

In order to make this possible it is necessary that the different organs and functional systems be capable of being activated whenever they are needed by the adaptive mechanisms of the organism, but it is also important that their readiness to respond to such activation be regulated in accordance with the physiological state of the activated organ itself. If an organ is diseased or excessively fatigued, stimulation to functional activity may be harmful. On the other hand, if the organ is healthy and in a good state of rest, functional activity may even be beneficial. In the state of excessive fatigue, therefore, the organ needs protection from activation, whereas in the state of healthy vigor, as in the play of children, one craves stimulation and activity and there may even be an urge to go in search of tasks to occupy one's senses and muscles and mind.

It is not difficult to bring these mechanisms into relation with certain facts from general physiology. One of the fundamental properties of protoplasm is irritability, the capacity to react to stimulation. This property is obviously dependent upon the fact that in each tissue there is stored latent energy that is released or discharged by appropriate stimulation. Just how a tissue will respond to stimulation in a particular instance will depend not only upon the character of the tissue and of the stimulus, but also upon the intensity and duration of the stimulation. A tissue or organ will react with its appropriate functional activity only if the intensity and duration of the stimulus exceeds the minimal threshold for functional response of that tissue. In addition to this minimal threshold there is also a maximal threshold. In general, if this maximal threshold is exceeded, the excessive stimulation will result increasingly in destructive changes in the tissue rather than in functional activity.

These thresholds obviously will vary according to the functional state of the organ stimulated. In general, we may expect that fatigue will tend both to raise the minimal threshold for functional activity and to lower the maximal threshold at which functional activity begins to be impaired. On the other hand we may expect that in states of high functional readiness the minimal threshold will perhaps be lower and the upper dangerous threshold higher.

These variations of threshold according to the functional state of the stimulated organ are also supplemented by regulatory mechanisms on a higher integrative level. In order to protect the fatigued or unhealthy tissue against excessive stimulation, we experience what we may characterize as a sort of reluctance to activity which may or may not be conscious but which exerts an inhibitory influence[18] upon the tendency of any integrative field to activate this particular tissue. Similarly the in-

[18] The paradoxical over-activity and resistance to sleep of the tired child, however, should warn us against an attempt to formulate these relations too simply. The exact relations should be worked out by experiment supplementing clinical observation.

creased readiness of the healthy tissue for activation is supplemented by some sort of eagerness for activity which again may or may not be conscious but will exert a facilitating influence upon the tendency of any integrating field to activate that particular organ. Indeed, the frequent need of healthy, happy children to find "something to do" would even seem to imply that in such cases the need for functional activity may play the dominant rôle and wishes and tensions derived from other biological needs might play a relatively negligible rôle in activating a particular integrative field. A child may ride a bicycle, for example, not so much because it wants to get to any particular place, but just for the pure joy of riding.

It is in this way, probably, that we can best understand the craving for stimulation of the various "erotic zones" which plays such an important rôle in the behavior of even the youngest infants. Freud has pointed out that these cravings for stimulation tend first of all to be attached to other organic functions, to the need for nourishment or for excretion. Finally many of them are subordinated at puberty as fore-pleasure mechanisms to the "primacy of the genital zone"[19] and to the biological goal of reproduction of the species. On the other hand, as Freud has pointed out, stimulation of the "erotic zones" is desired also for its own sake, quite independent of any activation by hunger or by tensions arising out of the reproductive function. It is this independent kernel of desire for stimulation for its own sake that I should like to identify with the need for functional activity of healthy physiological mechanisms. In this connection its significance would be two-fold. It is a direct manifestation of the need for functional activity of the sense organs themselves, but it is also an indirect manifestation of a need for activation of muscles and effector systems seeking for stimuli to activate them.

PSYCHIC TENSION AND PSYCHIC ENERGY

In psychoanalysis we are accustomed to use somewhat loosely the phrases "free psychic energy," "excess" or "superabundance of psychic energy," "lack of free psychic energy." In the light of the above discussion it is now possible to give these phrases a more precise meaning. Let us assume a hypothetic threshold at which the craving for functional activity of an organ disappears, at which "functional reluctance" appears in place of "functional readiness." At this threshold point we might picture a physiological system as supplied with its normal quota of psychic energy; above or below this threshold we might speak of "excess of psychic energy" or "lack of psychic energy" respectively. Thus, somewhat schematically, if an organ or functional system is in a state of functional readiness, craving activity, we may picture it as filled with more than its normal

[19] In "Three Contributions to the Theory of Sex," Freud (7) demonstrated that the manifold variety of sexual behavior could not be understood in terms of a simple drive whose goal is union of the genitals of the opposite sexes and reproduction of the species. On the contrary he was able to prove that the sexual urge is a composite one originally directed toward many different goals and only with difficulty subordinated, in the course of individual development, to the biological goal of reproduction of the species.

We may now note that our analysis of goal-directed strivings in general corresponds closely to this early analysis by Freud of the relation between the reproductive urge and the subsidiary partial sexual aims which at puberty must be subordinated to the "primacy of the genitals."

On the other hand, as we have seen, the phenomena of sublimation indicate plainly that these cravings for stimulation and functional activity may be also subordinated to strivings toward all sorts of other goals as well as sexual ones. The question arises, therefore, whether the craving for stimulation and for functional activity of the various "erotic zones" may not have a more general significance. Indeed this suggestion has already been twice offered by Freud himself (9, 10), only to be immediately somewhat arbitrarily rejected.

quota of energy and ready to overflow.[20] On the other hand, if an organ is in a state of fatigue or functional reluctance, we may picture it as lacking its normal quota of energy and therefore resistant to activation and to discharge of its already deficient stock of energy.

We picture the relation between psychic tension and psychic energy as an extremely flexible and adaptive one. Psychic energy is activated by psychic tensions and psychic tension tends to be neutralized by the activation of psychic energy. Especially the activation of energy that is ready for discharge is experienced as pleasurable and tends to neutralize the activating tension. As example of this we may cite the common observation that one can diminish the intensity of hunger or fear by doing something about it, even though food or safety may not be immediately available. We have also called attention[21] to the ability of satisfying phantasies to quiet disturbing tensions. Similarly children use masturbation or thumb-sucking as a consolation for feelings of frustration or as a means of binding or "erotizing" anxiety. In an obstetrical hospital, for example, I once saw a minor but painful operation performed on a very young infant with no anaesthetic other than a bit of gauze soaked in sugar water which the infant was allowed to suck. It sucked very vigorously but did not once whimper or cry during the whole operation.

Most important are the quantitative relations between psychic energy and the activating tension. If the energy of a functional system be below its "normal" quota, we may picture its "functional reluctance" as opposing any activating tension. If the activating tension is great, however, it may overpower the opposing tension of the functional reluctance until such time as increasing resistance is able to equal and counterbalance the activating tension. We shall designate as "available psychic energy" the amount of energy that may be activated before this point of equilibrium between activating tension and functional reluctance is reached.

If there is no strong activating or inhibiting tension, the need for discharge of energy will manifest itself in spontaneous playful[22] activity that is ready for anything, that seems to run in search of goals to occupy it.

The tendency of excessive energy to discharge may, however, be opposed by an inhibitory tension, thus giving rise to an ever-increasing pressure demanding release of the dammed up energy. As examples, we may cite the traumatic consequences that ensue when a child's hands are tied to prevent it from sucking its thumb or when toilet training is too early, too sudden or too severe.

TENSION OF A DRIVE AND ITS RESOURCES

Just as we contrasted integrative capacity and integrative task, so also it is useful to distinguish carefully between 1) the tension of a drive or wish and 2) the resources or means available to satisfy it. As we have seen, a psychic tension is a state of need that does not imply any knowledge of means or indeed the existence of any means to satisfy it. Sometimes the possibility of satisfying one's desire is dependent upon external circumstances. One cannot satisfy one's hunger unless there is

[20] We must be careful, however, not to think of such a tendency to overflow in too automatic and passive a manner like water spilling out of an open container. In accordance with the analysis already made we must picture the process of overflow as a much better regulated process, perhaps analogous to a mechanism whereby an increased strain upon the elastic walls of a container would give rise to a signal for a release mechanism.

[21] See page 237.

[22] In the play of children, play tends to become earnest, often very earnest indeed. In the above description I am speaking of play that is still playful, that has not become involved in a too earnest striving for any particular goal.

food within reach. But one's ability to satisfy one's needs is not dependent upon external circumstances alone. One must also have resources within oneself. The most important of these necessary internal resources are knowledge of how to attain one's goal, sufficient confidence in the success of one's strivings to encourage one to pursue one's goal effectively, and a state of relative functional readiness in the organs whose functional activity may be required. Thus briefly we may divide the internal resources of a drive into 1) those based upon previous experience and 2) those dependent directly upon the momentary physiological state of the organism.

1) In much of the current discussion of the drives we seem to ignore the fact that at least in human behavior, practically every one of the important drives must *learn how* to attain its goal. The drive itself consists only of a rather helpless excitement or tension and a few rudimentary instinctive motor mechanisms plus the capacity to learn and retain other motor mechanisms that may later succeed in reaching the goal of the drive. In a very important sense the drive originally does not even "know" its own goal. The goal exists only as a potential incentive for the learning process, as a tendency to reinforce and cause the retention of motor mechanisms that have once been successful in reaching it. Probably the first step in this learning process is to learn to know what one wants. The latent or potential goal of a drive must become an actual incentive. One must learn that food quiets hunger. This is the most elementary cognitive field by means of which the drive can exert its influence upon subsequent learning. Under the guiding influence of this knowledge one can then begin to learn how to get food.

It is important, therefore, to keep constantly in mind the modifying influence of the learning process as contrasted with the rather helpless excitement arising out of the tension of the original biological need. The goal of such a tension is a negative one, merely to escape the unpleasant tension, and its tendency is toward diffuse motor discharge. It is knowledge and hope based upon the memory of previous success, on the other hand, that gives one a positive and more sharply circumscribed goal. We must distinguish carefully between this positive attraction toward a more circumscribed goal and the negative and diffuse need merely to escape from an unpleasant tension. In general, the goal of one's strivings is also desired for its own sake and not only as a means of escape from an unpleasant tension.

In building up the integrative capacity of a goal-directed tendency, this positive attraction of the goal plays a most important rôle. Hopes and purposes, as we have seen, are derived from phantasies and retain some of the satisfying character of phantasies. Confident of attaining one's goal, one already enjoys one's success in anticipation. The pleasure derived from the anticipation now tends to neutralize the tension of the underlying need and in this way to diminish its tendency to diffuse motor discharge. Finally, the positive attraction of the goal tends to direct the diffuse motor discharge of tension into more circumscribed channels by facilitating those motor pathways that lead to this particular goal and inhibiting those that would interfere.

It is evident, therefore, that the fate of the tension of a drive at any given time is largely dependent upon the extent of its resources in terms of past learning and of the memory of previous success. If these resources are not available the tension must continue to rise, seeking constantly for discharge in dif-

fuse motor activity which never leads to real satisfaction of the underlying need. On the other hand, if the drive tension is supplemented by knowledge and by confidence that one knows how to reach the goal, then the motor discharge is channeled and integrated and is likely to result in achievement of the goal and quieting of the underlying need.

From all of this it follows how erroneous it is to attempt to jump at one step from the analysis of actual behavior to conclusions concerning "fundamental biological tendencies" in the hereditary constitution of an individual. As we have just seen, the hereditary pattern in the human being consists almost exclusively of drives that are helpless to attain their ends. Only learning and the experience of success can make an individual less helpless. If an individual's behavior is predominantly characterized by attitudes of helplessness and dependence, it is quite unjustifiable to conclude, therefore, that he was born with a very strong dependent or "oral erotic" tendency in his hereditary constitution. It is only after very careful genetic analysis of the resources derived from an individual's life history that we can safely attempt to deduce any conclusions concerning the nature of his inherited drives. Without such genetic analysis, the character of his observed behavior can obviously tell us nothing trustworthy about his hereditary patterns.

2) In estimating the internal resources of a drive it is also important to consider the physiological state of the organism itself. We have already discussed the importance of the state of functional readiness of subsidiary mechanisms. It is also of importance to take into account the functional readiness of the integrative field. We have already called attention to the fact that confidence in one's ability to achieve one's goals is not always based upon memory of previous successes, but may be part of a quite generalized mood of optimism resulting in some cases from endogenous physiological factors. We may now take account of these endogenous factors in our scheme by thinking of them as affecting directly the state of functional readiness of the integrative field itself. Moreover it is not only the hope of success that one enjoys. One enjoys also for its own sake the skill and self-mastery of successful purposive behavior. What we have called the integrative capacity of a goal-directed striving is built up out of these two factors—anticipation of success and joy in planful activity for its own sake. We may probably look upon both as manifestations of the functional readiness of the integrative field.

There seems good reason to assume also that the influence of previous success or failure in determining the level of confidence may be effected through the medium of the influence of success or failure upon the state of functional readiness or fatigue of the integrating mechanism. One is frequently able to observe clinically that a short period of the tension of unsuccessful effort or of an unresolved conflict is more fatiguing than a whole day of strenuous but successful work. It seems probable, therefore, that memories of previous failures will tend to induce more rapid fatigue of the integrative field and in this way rapidly to diminish its integrative capacity. Certain observations of Pavlov seem to be in harmony with this conclusion. Pavlov reports that many repetitions of a conditioned reflex will inevitably result in a slow transition to inhibition of the conditioned reflex. The development of inhibition, however, takes place much more slowly if there is prompt reinforcement of the conditioned reflex by following it with its proper unconditioned stimulus. Pavlov

(25) himself explains this fact by suggesting that the cortical excitation resulting from a conditioned stimulus is probably much more prolonged and results in much greater fatigue if the reflex is not promptly reinforced. He illustrates his concept of the significance of reinforcement by citing the analogy of "an efficient and watchful signalman who after having performed his responsible duties has to be provided with an immediate rest during which he is refreshed, so that he may afterwards perform his task again with the same efficiency as before."

In this way we approach some understanding of the physiological basis for our hypothesis that confidence in success is closely related to the functional readiness of the integrative field whereas loss of confidence would be correlated with fatigue of the integrative field.

SUMMARY: DYNAMIC SOURCE AND MODE OF OPERATION OF AN INTEGRATIVE FIELD

Let us now make use of these somewhat schematic concepts to summarize in as simple terms as possible our picture of the dynamic relationships 1) between a biological need and the integrative field of a goal-directed striving derived from it and 2) between this integrative field and subsidiary mechanisms.

1) We have seen that the integrative capacity of a wish or drive tends to be undermined when its intensity becomes too great. On the other hand, confidence based either upon the memory of previous success or upon endogenous factors tends to enhance the integrative capacity. These facts may be readily understood upon the hypothesis that the integrative capacity of a cognitive field results from activation of its "available psychic energy" by the tension of the underlying need. In accordance with the facts to be explained, we assume that memories of previous successes constitute a sort of reservoir of energy in the integrating mechanism which may also be enhanced or diminished by other factors that affect its physiological state of readiness (*i.e.*, the endogenous factors influencing confidence). The paradoxical relations between tension and integrative capacity can then be understood as follows. So long as the tension does not exceed the available energy of the integrative mechanism, so long will the integrative capacity of the goal-directed striving increase with increasing tension (see Figs. 2A, B and C). But as soon as the tension of the need begins to exceed the available energy of the integrating mechanism, the effect of increasing tension will be the opposite. Up to this point the increasing tension will have merely activated increasing amounts of the available psychic energy of the integrating mechanism. But from the moment that the available psychic energy of the integrating mechanism is exhausted, any excess of tension will now tend no longer to augment the integrative capacity of the goal-seeking mechanism but will rather augment the tension which this integrative capacity must master. Instead of augmenting the integrative capacity it will now augment the integrative task (see Figs. 2D and E).

2) These relations between psychic tension, psychic energy and integrative capacity may also be used to clarify the varying relations between the integrative field and subsidiary goals. As we have seen, the goal-directed striving acting through the medium of a cognitive field, must successively activate one subsidiary goal after another and inhibit other goal-directed strivings, all in accordance with the time schedule contained in the cognitive field. It is obvious that the difficulty of this in-

tegrative task will vary greatly according to the amounts of psychic tension and psychic energy that are bound in the various subsidiary goals and motor mechanisms. A subsidiary goal that is not in a state of functional readiness will be difficult to activate. The attempt to activate it may be subjectively felt as effort. It will involve tension between integrative mechanism and subsidiary goal in order to overcome the resistance of the subsidiary goal to activation. This in turn will involve an increased strain upon the integrative capacity of the dominant goal-directed striving.

On the other hand, a subsidiary goal that is endowed with a large amount of free psychic energy will be easy to activate but difficult to inhibit at times when the schedule requires that it be inhibited. This task of inhibition will also increase the strain upon the integrative capacity of the end goal. As a result there will arise difficulties which we may group together under the general heading of impatience and inability to wait.

Finally, if the sum of the tensions between end goal and its subsidiary goals at any time exceeds its integrative capacity, the result will be a disintegration of the dominant goal-directed striving.

INFLUENCE OF INCREASING TENSION UPON AN INTEGRATIVE FIELD

FIG. 2A. Low tension provides inadequate incentive; task requires too much effort; project not attempted.

FIG. 2B. With rise of tension integrative capacity becomes adequate to undertake task.

FIG. 2C. Super-abundant integrative capacity is now adequate for even more difficult task.

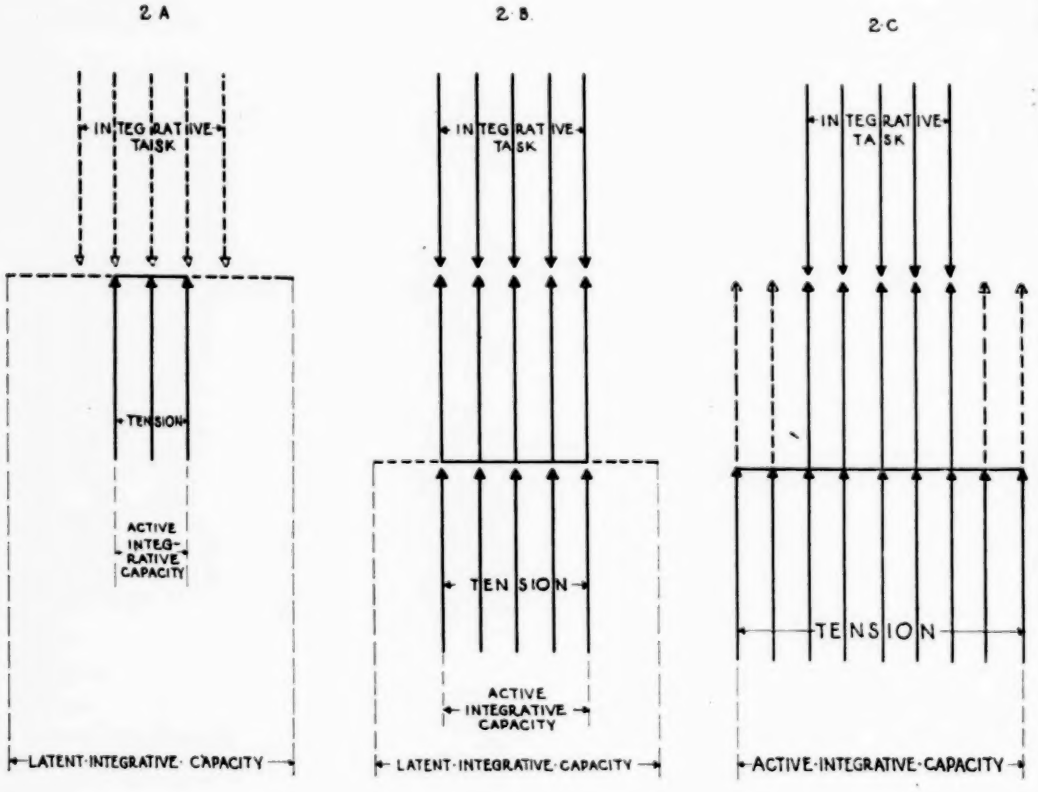
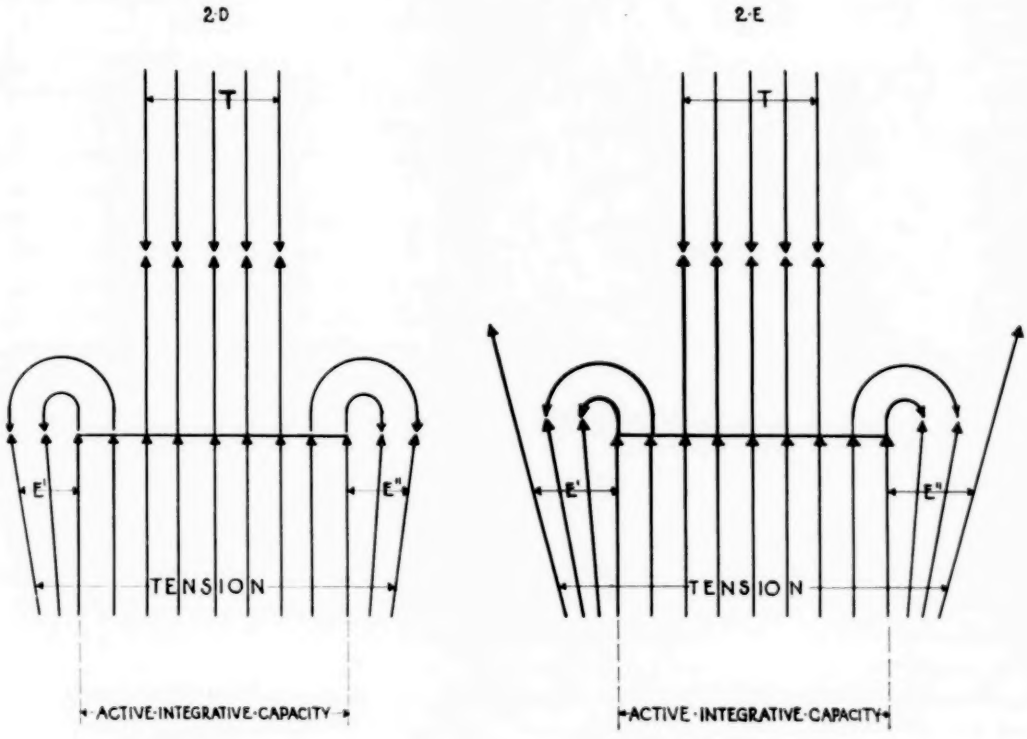


FIG. 2D. Excessive tension increases integrative task.

FIG. 2E. Further increase of tension leads to beginning disintegration of goal-seeking mechanism.



Explanation of diagrams 2A, 2B, 2C, 2D and 2E:

Horizontal line including dotted portion represents available psychic energy of integrative field which we call its latent integrative capacity; to become effective this latent integrative capacity must be activated by tension of underlying need. That part of the latent integrative capacity that has been so activated we call the active integrative capacity which is represented by the solid portion of the horizontal line. Number of vertical arrows extending upward to horizontal line indicates amount of tension of underlying need. Number of vertical arrows extending upward from horizontal line corresponds to active integrative capacity of integrative field and indicates amount of tension that integrative field is able to exert to overcome resistance of integrative task. Number of arrows extending downwards in figures 2A, 2B, 2C, is quantitative measure of integrative task, T. In figures 2D and 2E, the integrative task, T, is augmented by excess tension, E, of underlying need (the arrows E′ and E″ extending out beyond limits of integrative capacity). Total integrative task therefore = T + E.

Figures 2A to 2E represent the effect of progressively increasing tension upon the efforts of an individual to perform a task, T.

FIG. 2A. Low tension provides inadequate incentive; task requires too much effort; project not attempted. (Hence no arrows extending upward from horizontal line.)

FIG. 2B. With rise of tension integrative capacity becomes adequate to undertake task.

FIG. 2C. Super-abundant integrative capacity (see dotted arrows) is now adequate for even more difficult task.

FIG. 2D. Excessive tension (see arrows E′ and E″) increases integrative task.

FIG. 2E. Further increase of tension leads to beginning disintegration of goal-seeking mechanism. (Note arrows extending out beyond restraining influence of integrative field).

IV. Applications

This analysis of the internal dynamic organization necessary for the success of goal-directed strivings is of course still very approximate and will require to be refined and perhaps corrected in many details. We shall learn its deficiencies and inadequacies in the course of attempting to apply it to specific problems that present themselves in our psychoanalytic experience. In conclusion I wish to proceed, therefore, to consider a few of the problems upon which I believe this analysis throws light even in its present rough and sketchy form.

Frustration and Rage

The significance of frustration and rage is a problem that has necessarily played a very important rôle in the development of the psychoanalytic theory of the drives. In his theory of the death "instinct," Freud (*12*) postulated that the tendency to self-destruction and secondly to destruction of other objects is one of the two fundamental drives dominating the behavior of all living beings. He believed this destructive urge to be a component in varying degree of all living activity. I have already indicated what I feel to be the chief objection to this sort of formulation. If all kinds of behavior are to be understood as fusions in varying proportions of eros and death instinct, then we have only a single quantitative scale to account for all the manifold and complex variations in human and animal behavior. Moreover, the theory of the death instinct pays no attention to specific conditions that may provoke destructive behavior but seems tacitly to assume that the destructive urge is operating continuously as a primary cause except in so far as it is neutralized or modified by the life instinct. As I have already stated, the difficulty with this formulation is that it explains everything so easily. No theory of the drives can be of much value unless it can give us some idea of the specific conditions upon which the activity of each drive depends.

If we examine the specific factors in the manifestations of rage, three characteristics stand out: 1) the fact that it is released by frustration; 2) its destructive goals; and 3) its tendency to sudden and massive discharge of energy. Let us attempt to bring these three peculiarities of rage reactions into relation with our reconstruction of the dynamic organization of goal-directed behavior.

First, what do we understand by frustration? Frustration occurs when one must recognize that a goal that one has been pursuing with some confidence of success is unattainable. It would throw considerable light upon the other two peculiarities of the rage reaction, therefore, if it should turn out that they are deducible as natural consequences from the profound reorganization made necessary by the more or less sudden realization that a goal toward which one has been striving is unattainable.

We have already seen that confidence in one's ability to attain a goal is one of the important dynamic factors upon which the integrative capacity of the goal-seeking mechanism is dependent. If now this confidence is first threatened, then destroyed, we may expect in succession two sets of reactions. First, while the possibility of achieving the goal is only threatened and not yet destroyed, the integrating mechanism will be stimulated desperately to mobilize all available energy upon the subsidiary goal of overcoming or destroying the obstacle. While the integrative capacity of the original goal is still mobilized upon this destructive subsidiary goal, there comes now the final realization that the original goal is unattainable. The integrative influence of the original

goal is now destroyed completely. Up to this point the integrative capacity of the central integrative field has been utilized not only to activate the subsidiary goal of destroying the obstacle, but also to inhibit discharge of the newly mobilized energy in ways that might interfere with the ultimate realization of the original goal. With the destruction of the original integrative field, this inhibitory influence disappears. The energy that has been activated and that has already been given a destructive goal may now escape from the domination even of subsidiary goals and become a more or less diffuse discharge of motor energy. Moreover in so far as this energy comes under the influence of any goals at all, its aims will tend to remain predominantly destructive.

PROGRESSIVE DIFFERENTIATION AND FIXATION OF GOAL-DIRECTED STRIVINGS

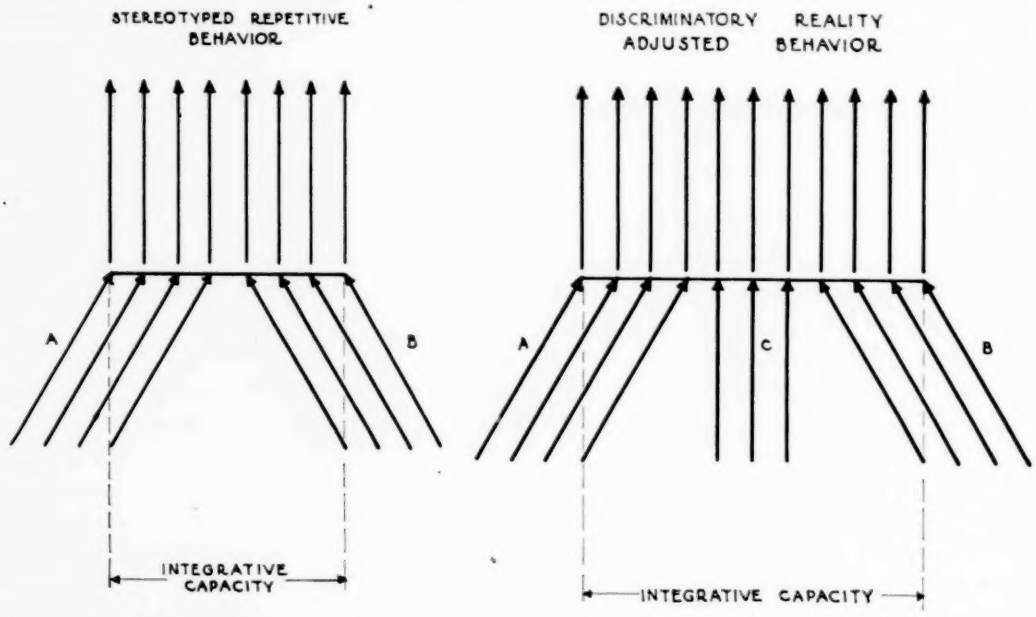
In considering this sort of disintegration of goal-directed behavior into more or less uncoordinated destructive rage, one gains also another impression which I believe to be of considerable value for the theory of the drives. Even in play, when psychic energy has once become bound in the service of a particular goal, one gains the impression that this process sooner or later becomes irreversible. Play becomes earnest. Sometimes when our patients most fear frustration, they attempt to protect themselves from the possibility of frustration by avoiding committing themselves too completely to any goal. A girl who has once suffered a severe frustration in love will often attempt to protect herself from that time on by taking all love affairs lightly. She attempts from then on to play with love. If she ever really falls in love again, she senses that there will be no drawing back. It is very difficult to relinquish a desire to which one has thoroughly committed oneself.

The same principle holds also not infrequently for the choice of means. Not infrequently one becomes committed to the need not only to satisfy one's desire but to satisfy it in a particular way. One is not only committed to the original goal but becomes fixated also upon a subsidiary goal. The choice of subsidiary goal has also become irreversible. It may be necessary, for example, for some purposes, to solve a mathematical problem. The problem offers difficulties. One becomes involved in it. Sometimes one cannot rid oneself of the need to solve it although it would be much easier to look up the answer.

There would seem to be some analogy between the process of progressive differentiation of goal-directed impulses and the course of differentiation of cellular tissues. The cells of the body are all derived from a single totipotent egg cell. Gradually the cells created by division of this egg cell become differentiated into many different types of somatic cells. At certain points in this development the differentiation becomes irreversible. The nerve cell must continue to be a nerve cell or die. It cannot retrace its development and then become a muscle cell. Similarly we get the impression that psychic energy in the course of elaboration of goal-directed tendencies becomes bound first to a goal, then perhaps more narrowly to particular subsidiary goals. Once one has committed himself to a particular way of obtaining gratification, the particular quantum of psychic energy that has been activated by that goal becomes irreversibly bound to it. It is not easy to stop suddenly in one's course and shift to another method of attaining one's ends even though one is confronted with plain evidence that another way of attacking one's problem would be much better. There is a strong

tendency to remain fixated upon the original plan of procedure. It is for this reason probably that revenge reactions and the talion principle play so important a rôle in psychopathology. A girl who has been jilted, for example, might perhaps rather easily find another man who originally might have attracted her just as much, but that would require real renunciation, release[23] of the energy bound in her first love affair, and the turning of that energy to another goal. Otherwise she remains fixated upon the original frustration and can only vent the bound energy in an urge repeatedly to seek revenge for her frustration. Thus, if the goal-seeking tendency to which the energy is bound

[23] This can be accomplished only by a process of living through the reactivated emotional conflict in such a way as to come to the realization that another love affair need not necessarily turn out so disastrously. In a previous paper I have called this "emotional learning" (for more detailed discussion see French, *3*). The necessary conditions for such emotional learning are an integrative capacity sufficient to span both 1) the conflicting tensions arising out of the original traumatic memory and 2) the task of comparing and distinguishing between the original trauma and a present opportunity for satisfaction. The principle is illustrated in the following diagram:



Explanation of above diagrams:

As in Figure *2*, horizontal line represents integrative capacity. The slanting arrows (A and B) represent the tensions of two conflicting needs, for example a forbidden sexual urge and fear of punishment. In the first diagram we picture the integrative capacity as wholly preoccupied with the task of reconciling the two conflicting needs and without any reserve capacity to take account of new features in the present situation that may differ from the original traumatic situation out of which the patient's fear of punishment arose. Patient's fear of punishment, for example, may be based upon memories of his father's very punitive attitude. Due to his preoccupation with the conflicting tensions of his sexual urges and his fear, he will be entirely unable, for example, to take account of the fact that he is now dealing with the analyst whose attitude toward forbidden impulses is much more tolerant. The result will therefore be a stereotyped repetition of behavior which may have been appropriate for the original childhood situation, but which is quite inappropriate to the realities of the present situation.

In the second diagram we picture the integrative capacity as somewhat greater and therefore able to take account not only of the two conflicting tensions, but also of the new features of the present situation (represented by arrows C) that differ from the earlier traumatic memories and will thus enable him to correct the pattern of his earlier reaction to the traumatic memories, and to behave in a discriminatory fashion that is adequate to the present real situation. Instead of reacting to the analyst as a punitive father, for example, he will take account of the analyst's actual attitude of encouraging patient to confess forbidden impulses.

is frustrated, its only possible fate is to undergo destructive degeneration, to discharge itself in some destructive form.

RELEASE OF ENERGY BY EASY SUCCESS

Another situation that will lead to a sudden release of energy is the unexpectedly easy achievement of a goal toward which one had been striving with intense effort. Freud has twice alluded to this problem. This is of course the mechanism of wit (Freud, *8;* Kris, *20*). The suddenly released energy is discharged diffusely in laughter. Freud (*11*) has also pointed out that manic excitements of greater or less duration may be precipitated as a result of unexpected success. It would be of interest to study such reactions further from the points of view that we have been outlining.

EXPANSION AND CONTRACTION OF THE INTEGRATIVE FIELD

I shall allude very sketchily to only one more possible application of these studies—an application which I think may offer important possibilities for future research.

We have already pointed out that psychic energy that is not bound by any pre-existing psychic tension tends to manifest itself in playful activity, and, as it were, to go in search of tasks to occupy it. We speak of such a person as "bubbling over," "full of life and energy."

It is not difficult to recognize similar tendencies to expansion of the integrative field. Self-confident individuals tend to reach out for new responsibilities. It is as though one were under necessity to employ the whole of one's latent integrative capacity. It is in this way probably that we are to understand the tendency to increased generosity in individuals who are well-satisfied and really sure of themselves to which Alexander has frequently called attention. In our psychoanalytic practice we have frequent occasion to observe this in the gradual mellowing of the personality that is one of the surest signs that a patient is achieving mastery of his conflicts.

On the other hand, any strain on the integrative mechanisms such as results from increased tension due to obstacles, frustration, psychic conflicts, etc., makes necessary a contraction of the integrative field in order to bring it within the limits of the ego's integrative capacity.

Dependent or eliminatory or expansive tendencies may occur as secondary reactions to such expansions or shrinkages of the integrative field. We have already noted that super-abundant integrative capacity tends to manifest itself by reaching out for new responsibilities. On the other hand, by seeking help one may attempt to transfer to another person the greater part of an integrative task that is in excess of one's capacity; or the need to diminish the integrative load under stress of an acute conflict may lead for example to an impulse to get rid of wife and children in order to concentrate the whole of one's integrative capacity upon the task of solving the immediate conflict.

I suspect that factors of this sort involving changes in the integrative capacity of the ego or in the character of the task with which the ego is confronted would throw light upon many of the reactions that have previously been explained as manifestations of presumably continuously active drives acting as primary causes.

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AUTONOMIC SYMPTOMS IN PSYCHONEUROTICS

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THIS PAPER concerns itself with the autonomic symptoms such as salivary, gastrointestinal and uterine disturbances, which appear in psychoneurotics. It is the purpose of this paper to establish the relationship between these symptoms and the total psychological settings in which they occur.

To begin with, we shall define the concepts about which this study is oriented. The first of these is the idea of successful mastery. By successful mastery we understand the complete resolution of any tension or impulse accomplished without anxiety, inhibition, or other defensive integrations (such as reassurance, rationalization, etc.), and accompanied by the affect appropriate to such accomplishment. To illustrate, let us consider the relatively simple impulse of hunger. Successful mastery would include the individual's obtaining the food he wanted, and the eating of it with pleasure and satisfaction. To continue the illustration, let us imagine an individual upon whom, in childhood, certain food taboos were imposed, now living in a group where the observance of such taboos was not demanded. Such a person might react in very different ways to his desire for the tabooed food. He might regard the food with suspicion, and eat it with misgiving and apprehension (anxiety); he might quickly lose his appetite for the food (inhibition); he might ask assurance of a friend about the safety of eating the food (reassurance, a defensive integration); he might eat the food and not enjoy it (loss of appropriate affect); or he might develop various digestive disturbances (delayed anxiety or inhibition). These various reactions represent failure of mastery. Successful mastery, again, would include his appreciating the desire for food, obtaining it, eating it with pleasure and without any unpleasant sequelae.

Our next definition is of attitude. By attitude we refer to the cross section of the total individual at any one moment. It is analogous to one frame of a moving picture. If we examine the attitude of a man who has just been frustrated, we might see tension in the somatic musculature, spasm of the intestinal tract, sweating of the hands, forceful heart contraction, hostile thoughts, a facial expression of depression and injury, etc.

We define a psychoneurotic individual as one whose mastery is usually defective despite his possession of adequate equipment for achieving successful mastery.

Normally, when it has been established in an individual that an impulse can be executed adequately and without danger, mobilization for action follows. If the action involved in the resolution of a tension or impulse has become associated with an expectation of injury or frustration, the mastery of this impulse will be interfered with. The nature of the expected injury depends on individual past experience. It is varied, and can include physical injury, rejection, humiliation, etc.

In the attitudes during the period in

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which such an impulse is operating, there will be evidence of some reaction to this expected injury, be it anxiety, inhibition, loss of appropriate affect or some defensive integration. It is in these attitudes that autonomic symptoms may appear as the somatic components of the reaction. It is especially with the reactions of anxiety and inhibition that abnormal autonomic phenomena occur. We do not expect abnormal autonomic phenomena where there is no interference with mastery.

Anxiety is an excitatory reaction. We feel that it represents an acute and extreme mobilization of the basic physiologic resources of the individual preparatory to an action that may demand all the effectiveness the organism can muster. Many of the manifestations of what we recognize as clinical anxiety, such as tachycardia, the increased alertness and muscle tension, are evidences of this overmobilization. Common observation has taught us that under the stress of great anxiety, individuals can perform feats of strength far beyond their ordinary powers. This overmobilization can be directed towards execution of the feared act if the expected injury is not too severe, or towards flight if the conclusion is reached that action is not possible. Such a conclusion represents the resultant of forces stemming from the evaluation of the severity of the expected injury and the available resources necessary to cope with it.

Inhibition appears when neither execution of the feared act nor active flight from it are regarded as possible. Inhibition, physiologically, is a depression of function. It may operate in any phase of the development of the impulse. It may prevent the mounting of the tension, block the executive resources, or, if the action is already completed, it may appear as a belated collapse or interfere with the integration of the affect appropriate to this success. It may be focalized to the specific tension, or if the impulse is perceived as dangerous enough, it may dominate the entire attitude. Sleep, loss of consciousness, or catatonia would represent the extremes of such inhibition.

In many situations where the balance between the severity of the expected injury and the resources available to cope with it is a delicate one, both overmobilization with orientation to action, and inhibitory responses may exist simultaneously. What we see clinically as conflict is an expression of this delicate balance. It is for this reason that so often both excitatory and inhibitory manifestations appear together.

Psychotherapy provides us with an important additional technique for observing the attitudes of individuals. A patient under prolonged treatment repeatedly creates experimental situations for himself. The psychotherapist is able to observe over a long period of time the history of a set of impulses, is able to determine those concepts which are considered possible and impossible of mastery by the patient, and as each new situation arises, can accurately observe the fate and disposition of the impulse. Each new important situation into which the patient enters is an experimental situation. The experimenting psychiatrist need not create artificial dramatic scenes of non-specific emotional stress. It is even more useful and fascinating to observe the natural history of impulses in their real setting.

The clinical data to follow bear on the autonomic behavior (or symptoms) of four neurotic patients. It will be seen that the reactions vary widely in extent from small segments of the body in some instances, to widespread total responses in others. We recognize that there may be constitutional factors in the selection of the bodily segments which behave most prominently, and

also constitutional factors which would tend to make an individual react generally in an excitatory or inhibitory way, but this study is not concerned with such large factors; we are here presenting only specific, concrete data.

The first patient demonstrates waves of sleep as the outstanding phenomenon when mastery was defective.

CASE I

The patient was a 30-year-old male who began treatment in August, 1939. His chief complaints were a vague sense of unhappiness, premature ejaculations, inability to maintain sustained interest in any one woman, and social timidity. He was a successful business man even though he had often permitted others to exploit him.

The chief elements in his personality were a marked dependence on his mother and sister, to both of whom he was submissive and resentful. His social and sexual behavior was characterized by short-lived periods of interest in various women, an interest which always died down in short order. He was tremendously afraid of any permanent intimacy with a woman, always picturing women, in his thoughts, fantasies and dreams, as creatures who would enslave, exploit and injure him. His attempts to be friendly and tender were at once shot through by protective antagonisms. He became apathetic and forgetful with every new girl he met. He was maintaining a somewhat unsatisfactory stand-offish friendship with one girl mainly because he was so inhibited in his approaches to other new girls. In dealing with men he was beset by a constant sense of inferiority, was afraid to exercise authority, afraid to be equal or superior, and always conceived other men to be more important and powerful than he, to whom he must bow submissively. He never experienced conscious neurotic anxiety.

Some typical examples of his behavior were as follows: He had been sexually interested in a certain woman, he pursued her for months; he amused and entertained her, and finally spent a week-end with her at a hotel. That evening when they both retired he fell fast asleep as soon as they got into bed. The next night the same thing happened. Another incident occurred while on a trip abroad. He met a woman, and there was some preliminary love-making. She attempted to perform fellatio on him and he became panicky. Her display of sexual excitement terrified him. He went to his hotel room, pulled the shades, locked the door, got into bed, and remained in a motionless state for two days, describing himself as paralyzed, hypnotized and leadened. While lying on the couch during therapy, he displayed many instances of the following type of behavior: During many sessions he would abruptly fall asleep or would fall into states in which he was partly asleep but would continue to speak in a thick and garbled manner. After a number of these incidents occurred it became apparent that these episodes were specific reactions to certain types of material that came up for discussion during his sessions on the couch. The two subjects were his sexual wishes and his impulses to make money. Some typical situations were as follows: He was describing two girls whom he had met. As he described the first girl he suddenly became very sleepy, his speech became thick and he made some apparently irrelevant remarks, "British, French, pork prices." Then he spontaneously woke up and went on to describe the second girl, a voluptuous creature; he described her breasts, his desire to have sexual intercourse with her and his attempts to make a date with her. He suddenly went into a state of semi-sleep and while in it described

a fantasy; he had a whip, was cracking it and dictating to people who were afraid of him and agreeing to his demands. They said, "Yes, we will pay you the six cents." Then he fell sound asleep, and after about five minutes he was awakened. During this short sleep he had the following dream. "He was in a schoolroom with many benches. A fellow was showing him a blackboard with a pointer, no, a ruler. He was being shown something, he couldn't remember what." The associated ideas relevant to the dream were that he was now considering the physician as a teacher; he then went on to describe his sexual interest in the girl who had stimulated him, he spoke of his fears that a condom might break during intercourse, he mentioned previous dreams of seductive women and recent dreams of sexual intercourse. He added that when he went to bed at night he could fall asleep faster if he thought of sexual things. He obviously represented the physician as his teacher of sex, though in the dream the subject matter taught was blotted out. On another occasion he was describing his excitement about a pretty girl and he fell sound asleep and dreamed of pointed pencils. He had other similar episodes of falling asleep when dealing with financial matters such as his plans for making more money, plans for opening a new store or similar considerations. In the midst of such trends he would abruptly fall asleep and then experience fantasies or dreams which dealt with sexual material or triviata of daily life or else with material so fantastically irrelevant that it could not be traced. He frequently remarked that his attitudes to women and money were the same.

The patient was still under treatment in February, 1941. He was much improved. His sexual performance was much better; his sexual life was quite active; although still fearful he had a strong desire to get married. His attitude in business had improved. The episodes of falling asleep on the couch had become quite rare, tending to occur only when his sexual wishes were expressed most powerfully.

COMMENT

This man presented obvious difficulty in mastering sexual and other impulses. His characteristic response to a heightened tension was sleep, a generalized inhibitory symptom. Inhibition was his usual way of disposing of his sexual impulses. In one instance in which this measure was inadequate because of the aggressiveness of his partner, anxiety, flight, and then marked inhibition appeared in order.

The next patient demonstrates the appearance of conjunctival congestion in the setting of other inhibitory symptoms when mastery was defective.

CASE 2

The patient was a 30-year-old male who was under treatment for a period of two years. His chief complaints were partial sexual impotence, premature ejaculations, episodes of tightness in the head accompanied by an inability to think clearly or to use his mind efficiently. He was timid, unambitious, and afraid to approach women. As a college student he had had great prospects of success, but had fulfilled none of these expectations. The problem which drove him to treatment was the fact that his mother had been insisting it was time he were married, and he was faced by his sexual inadequacy which had to be repaired.

His important developmental relationships centered about his mother who had survived three husbands. She was a domineering woman who regulated all his activities in a commanding way. Time after time throughout his development she had forced him to

renounce various of his wishes, in sports and vocationally, to please her. Retaining the attachment to his mother finally became the most important factor in his life. He never thought of marriage because he "could not possibly trust the love of any other woman." He turned to her for advice in all things, including his sexual difficulties. He could mobilize no feeling of tenderness to any woman, and was always beset by feelings of sexual inferiority to others, as well as a sense of inferiority financially, professionally and in all other ways. His masturbation had been prolonged late in life and was always accompanied by fantasies of being beaten by a big powerful woman. The sight of a mother beating a child would stimulate him sexually. His first hysterical symptom, a feeling of tightness in the head, was definitely provoked by his decision to give up masturbation at the age of nineteen. He was inhibited in all important spheres of activity, sexually, professionally and socially. Occasional fits of ambition always surrendered to apathy.

Another aspect of his symptomatology soon became evident, though it was not included by the patient as one of his presenting complaints. These symptoms were episodes of sudden, severe conjunctival congestion of the left eye and a very mild congestion in the right. These episodes of conjunctival congestion occurred about once a week, would last from a few hours to a few days. They would appear any time of the day or night, sometimes occurred in his sleep, and were often provoked by dreams. This symptom almost always occurred in the setting of the other complaints, tightness in the head, inability to concentrate on intellectual work and interference with his professional efficiency. All these symptoms usually appeared together although occasionally one of the elements would be missing from the total picture. The patient got to include all the elements as parts of his "attacks." Rarely the conjunctival congestion occurred alone; it was painless and was occasionally preceded by a tickling sensation in the eye.

As treatment progressed it soon became evident that this symptom complex always appeared in response to certain definable situations. Any attempt on the part of the patient to be active in any sphere would produce a delayed wave of symptoms, usually within twelve hours. It got to the point that he would be afraid to even think about an expected sexual experience because he had learned that such thoughts provoked a later wave of "head and eye symptoms," as the patient put it. After sexual play or intercourse he would have the symptoms the next day. The means the patient evolved for handling these bursts of symptoms was to do practically nothing for several days, and the symptoms would slowly subside. The bursts of symptoms followed not only sexual fantasies or activity but also his attempts to carry out any forward moving impulse of any kind, whether it was related to a bit of assertiveness in business or in social life. A typical and highly characteristic sequence of events was the following: One day immediately after a psychotherapeutic session he went home in a wave of desire to overcome his sexual and work inhibitions. That evening he composed a poem to his girl, called her twice on the telephone, and spent several hours reading his professional books. He went to bed highly pleased with himself but woke up with a violently bloodshot eye and with all the usual symptoms which made it impossible for him to do any efficient work for several days. On one occasion he was suddenly awakened from sleep by the sudden occurrence of conjunctival congestion which occurred while dream-

ing that he was entering on a new, immense and unknown undertaking.

On many occasions he would develop conjunctival congestion in the middle of a working day while struggling with his tendencies to procrastinate and to delay doing certain tasks. During one week he had a nightly succession of dreams departing from home ties; during this entire week he had a daily succession of bloodshot eyes.

At no time did this patient display conscious neurotic anxiety. It should be remembered that this patient's attempts at mastery were halting and ineffective, that he was sexually inadequate, that his self assertive attempts were easily given up and that these waves of inhibitory symptoms were prominent during this period. After two years of treatment he was more ambitious, had married, was looking for a better job, was sexually potent, had given up his social timidity, and his symptoms had almost entirely disappeared. The conjunctival congestion appeared only about once every three months.

COMMENT

This patient illustrated very clearly waves of inhibitory phenomena whenever he attempted to execute certain impulses. A small segment of vasodilatation was a consistent element of the inhibitory wave. The interesting element in this patient was the delay in the appearance of the inhibitory phenomena; they usually appeared hours after attempt at mastery had been made.

The next patient demonstrates violent fluctuations in salivary secretion with changes in the patient's attitude to a situation. Whenever the patient's attitude was one of mobility and tended to action and some degree of mastery, there was profuse salivation: when this patient was unable to handle a problem and was inhibited there was suppression of salivation.

CASE 3

This patient was a 30-year-old female who began treatment in October, 1938. Her illness had begun in March of that year following the unhappy termination of a love affair. At that time she was disappointed, and temporarily lost interest in social activity. In June following, on the day of her grandmother's funeral, she developed overt anxiety. The symptoms became steadily worse, she developed palpitation, weakness, fears of traveling alone, dizziness, choking spells, fears of death, fear of twilight; she was unable to lie flat on her back; she was mildly depressed. During the period of March to June there was marked and constant dryness of the mouth.

She had always felt inferior and socially inadequate. She had never dared be definite in her likes and dislikes. She had been overweight as a child, and felt unattractive to men, and avoided social contacts whenever she could. Her relationships with men in the preceding twelve years were characterized by a marked inability to fall in love with an acceptable man; she felt so inadequate and unworthy that it was impossible for her to believe that a worthwhile young man could sincerely be in love with her. She immediately lost interest in the men who really liked her, and proceeded to have a series of hopeless loves for a long chain of worthless and irresponsible men; she rejected every proposal of marriage made to her during this time, and felt she deserved no better. She resorted to fantasies of being an actress, of being a beautiful girl being rescued by a handsome man. The developmental background showed a home marked by extreme insecurity; her parents were mismated, constantly quarreling, and repeatedly separating

and reuniting. The father hated fat women, and the patient's greatest post-adolescent problem had been that she was fat and unattractive.

In the first few months of the illness the element of dejection was present; with the subsidence of the dejection the dryness of the mouth disappeared. From then until the beginning of treatment in October, the anxiety symptoms dominated the clinical picture. There were occasional choking spells accompanied by waves of sleepiness.

Shortly after treatment began she met a young man who proposed marriage to her. The proposal was made on a Saturday night. On the Sunday and Monday following she developed profuse salivation. The salivation was so profuse that she drooled, wet the pillow at night and would awaken at night because of the profuse salivation. Her reaction to the proposal was a mixture of pleasure and anxiety. She liked the young man, felt in her own mind that she wanted to accept the proposal of marriage, as she subsequently did, but was fearful of committing herself. For the next four Saturday nights she regularly had appointments with the same man, and received proposals of marriage at each meeting: on each successive Sunday she had similar profuse salivation. The salivation would last all day Sunday, through the night and occasionally into Monday. Near the end of the month of November she had a few days of panicky depression; during this time she had a dry mouth. A few days later, just about Thanksgiving, she decided to marry the man, was very cheerful about the prospect, was having a good time, and proceeding in her mind with plans to go ahead; she was salivating profusely. In the middle of December she had definitely accepted the idea of marriage, was feeling well and salivating terrifically.

By February, 1939, she was at peace with herself, there were no abnormalities of salivation, and she was looking forward to marriage with a mixture of pleasure and mild apprehension. Late in February, one week before her next expected menstrual period, she became mildly depressed and slightly nauseated, felt tension in her throat and noted increased salivation. The dejection lifted rapidly though the patient was in anxiety for the next week; during this week she was again cheerful, continued with her plans for marriage, and was salivating excessively. She was in a happy frame of mind until March when the couple took out their marriage license; that night she was terrified and depressed, and had a dry mouth. She was violently sick immediately thereafter with a series of head colds, bronchitis, with expectoration, and food was tasteless, though the salivation was depressed only on the first day of this siege of illness. She was married by means of a civil ceremony within a week, and continued to be sick for another week. After that she became cheerful again, and continued well until June, when she was married by means of a religious ceremony. There was occasional anxiety, but no salivary disturbances. Treatment was interrupted at this point.

She reappeared for treatment in November, 1939, stating she had gotten along well until the preceding six weeks, at which time some of her symptoms returned. She was anxious, irritable, constantly quarreling with her husband, fearful that he was not showing her the sufficient degree of love and interest which she required. There was persistent dryness of the mouth. The dryness was most marked at night, which was the time she had the most anxiety, and was also the time her husband was home from work. At the beginning of December, following an especially bitter quarrel, the following

peculiar cycle set in. At night when her husband was home she would have anxiety and a very dry mouth. During the day when her husband was gone to work she was anxiety free and had profuse salivation. A spontaneous remark of the patient's was interesting. In comparing the two contrasting feelings she said, "I'll take the saliva rather than the dry feeling." This cycle lasted two weeks. From that point on she got along well with diminishing anxiety but with mild salivary hypersecretion. Treatment was ended in November, 1940. The patient was cheerful and active; there were no salivary disturbances.

COMMENT

This patient showed dramatic reversals in her major attitudes to her husband, and with these reversals there were concomitant reversals of salivary function. During the periods in which she was able to express her affectionate feelings and accept their relationship she experienced profuse salivation. These were the periods when she was moving towards successful mastery; when the total attitude was one of inhibition and tendency to failure in a situation there was suppression of salivation.

The last patient demonstrated alterations in menstruation, bowel function, and skin sensibility during a prolonged period of failure to mobilize an active attitude to situations.

CASE 4

The patient was a 28-year-old married female who appeared for treatment in October, 1939. A severe compulsion neurosis had been developing slowly since the time of her marriage one and one-half years before. The illness, which had been insidious, slowly progressive and almost unnoticed, suffered a sudden acute exacerbation three and one-half months before the beginning of treatment. She then developed feelings of unreality, there were obsessive repetitions of words and phrases, there was a compulsive need to know exactly what she must say or do the very next minute. There were profound feelings of inferiority and inadequacy. She gave up social activity, there was a general circumscription of initiative and interests; she slept poorly; there was mild depression and she toyed with suicidal ideas.

In the three months preceding treatment, when her symptoms were as described, her menses, which in the past had always been painful and profuse were now painless and scanty; there was a generalized insensibility to pain over the entire body; there were mild diarrhea, loss of appetite and weight and headaches.

In the eighth week of treatment she was able to make her first spontaneous effort to pull herself out of her inhibited and inadequate behavior. She became self-assertive, was able to compete in games successfully, felt happier, self-satisfied and more confident. During that week she menstruated: this menstrual period was again painful and profuse; the diarrhea stopped, her appetite returned, and her friends spontaneously began to remark that she looked different in some way. Although subsequently she had many recurrences of symptoms, her range of activities continued to remain normal, and she continued to mobilize her efforts for activity. Overt neurotic anxiety was developed for the first time with the sudden accession of activity. The anxiety subsided in a few weeks, at which time the diarrhea reappeared for a short time.

The patient's attitude and behavior continued to improve, and the menstrual and other phenomena which had been present for the three months' pe-

riod of relative inactivity did not recur. The patient was discharged in December, 1940.

COMMENT

During a prolonged wave of failure of mastery there was skin insensibility, painless and scanty menstruation, and diarrhea. The sensory and uterine changes are compatible with a total attitude of inhibition. When the patient was able to mobilize a more effective attitude to her impulses the abnormal phenomena mentioned abruptly disappeared. This happened even though the neurosis had not yet been cured. What had been accomplished was a more effectively mobilized attitude on the part of the patient to her impulses and problems.

DISCUSSION

The clinical data bear on the autonomic phenomena of certain neurotics who were reacting in the direction of activity or in the direction of inhibition. The impulses and tensions described were either sexual, financial, any self-assertive ambition, or a total handling of the environment. Inhibitory or excitatory somatic phenomena correlated were sleep, conjunctival congestion, salivation, uterine behavior and skin sensibility. Inhibition or excitation of these various somatic functions were specifically related to inhibition or excitation of these as part functions of the human body in an attitude.

We define successful mastery as the complete resolution of a tension or impulse accomplished without anxiety or inhibition and accompanied by the affect appropriate for the action. We hypothecate that psychosomatic or autonomic symptoms occur with the defective mastery of some impulse or situation and that these symptoms are manifestations of heightening or collapse of the efforts at mastery. This orientation is not entirely novel. In 1932, Kardiner (*3*), in studying ego reactions to serious traumata, recorded an entire series of autonomic phenomena including epilepsy associated with the inhibitions following such traumata. To these phenomena he applied the name of physioneurosis. He considered the autonomic discharges as the one avenue of aggression left open to the individual after the traumatized ego had become too inhibited to act normally. He applied the term physioneurosis to all the somatic, non-ideational symptoms. In 1936, Daniels (*1*) referred to the autonomic phenomena in a case of neurosis with diabetes as physio-neurotic. Kardiner, in discussing Daniels' case, advanced the hypothesis that the physioneurosis was the end result of a series of inhibitions. In outlining a course for future research he pointed to the need for locating the ego inhibitions.

We differ from Kardiner's formulation by considering the autonomic phenomena not as secondary processes, but as integrated parts of the attitude in defective mastery.

Flynn (*2*), in 1937, similarly approached the study of twenty psychoneurotics from the standpoint of success or failure. He suggested that problems which could be surmounted by the neurotic individual gave rise to an emotion in which the predominant physical manifestations were due to stimulation of the sympathetic nervous system, and that problems which could not be surmounted gave rise to an emotion in which the predominant physical manifestations were due to stimulation of the parasympathetic system. He conceived of this in terms of utility, *i.e.*, if the problem were insurmountable, there was no need for mobilizing the sympathetic system. We believe that Flynn's concept of success or failure is important, though we do not agree with

his conclusions as to the sympathetic and parasympathetic systems. We think simply in terms of excitation and inhibition.

Many workers have attempted to correlate the specific nature of an impulse with the specific autonomic symptom. We do not believe there is any limited specificity, excluding those symptoms that are the direct consequences of the involvement of the executive apparatus for a specific impulse—such as in sexual impotence. We feel that it makes no difference whether it is a hostile impulse, a sexual impulse, an emotional attitude or any kind of impulse or situation. The important factor we see is that so long as any impulse or situation is viewed as dangerous and cannot be normally mastered there must be some expression of this failure of mastery in the autonomic integration. In terms of such a concept the specific detailed type of problem or personality has no importance.

The character of the specific autonomic symptom varies from individual to individual. In each individual there tends to be his own stereotypy of reaction. In one person we may see diarrhea, in another salivation, in another conjunctival congestion, etc. We recognize differences in individuals, to which in the present state of our ignorance we must still refer as constitutional, factors which not only play a determining part in the character of the autonomic integration but which may also determine if and when mastery shall fail.

Summary

1. A psychosomatic concept of behavior is proposed in terms of mastery and failure of mastery. Autonomic symptoms in neurotics are conceived of as parts of the total attitude in which there is either heightening or collapse of efforts at mastery.

2. Clinical data are presented to illustrate the various excitatory and inhibitory phenomena comprising the abnormal efforts in defective mastery. These phenomena included disturbances of sleep, conjunctival congestion, salivary and menstrual irregularities and disturbances of skin sensibility.

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A PHYSIOLOGICAL APPROACH TO THE CONCEPT OF ANXIETY

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I. TERMINOLOGY

CLEAR THINKING about the problem of anxiety is made difficult by terminological contradictions; and no clarification is possible until this confusion of words and concepts is completely eliminated. At first thought this is somewhat surprising; because when used in its primary descriptive sense the word characterizes a simple, conscious experience which no human being can fail to recognize: to wit, an uneasy apprehensiveness which may creep up slowly, which may remain as a chronic state, or which may come and go with explosive suddenness. It needs no psychiatrist or analyst to recognize, describe, and name this commonplace and universal human experience.

However, in psychoanalytic usage, the term anxiety has been expanded to cover a wide variety of other things. Originally, it was simply a name for the specific conscious emotion, irrespective of the circumstances which evoked it. Later, however, this emotional state was called "anxiety" primarily when it was precipitated by situations that were devoid of actual danger, whereas a qualified name was used for the same emotion when danger was actual (*i.e.* "Real Angst") or "objective anxiety." Or again, the word has been used not for the emotional state proper, but rather to characterize a variety of anticipatory situations or possible precursors of the emotion: such as the warning signal that one may find oneself in a situation of temptation, or in a situation of guilt or of anger. Just what part of the total psychological constellation is characterized here as constituting the "anxiety" is never quite clear: whether it is the situation which precipitates the emotion, or the somatically perceived warning signals of future emotion, or the latent unconscious feelings which have not yet come to expression. Furthermore, the reaction is sometimes attributed to one topographical aspect of the psychic mechanism, and sometimes to another.

Again, the word has been applied to certain states of unconscious tension, which if they should burst through into conscious and overt expression might then manifest themselves either as frank, symptomatic terror states, or as overt states of rage or depression, or else in any other of the whole gamut of neurotic or psychotic symptomatology. This relatively undifferentiated state of inner tension, which may ultimately achieve expression in a wide variety of symptoms, is often spoken of as "unconscious anxiety." And finally, sharply differing symptomatic states themselves, no matter how diverse their appearances, are often loosely referred to as "states of anxiety." A man who is in a rage is said to be in a state of terror. A woman who is vomiting is said to be scared. An obsessional is "in a panic," etc.

This verbal practice results in a curious elliptical jargon, as confusing as it

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would be were we similarly to distort the language process in defining other medical phenomena. For instance, if we used the word "fever" in as varied a fashion as we use the word "anxiety," we would find ourselves applying it sometimes quite simply to any elevation of temperature above a certain established norm, at other times to such an elevation of temperature only when it was produced by an infection, but not when it was produced by dehydration, toxic absorption, or disturbances in the temperature regulating apparatus. Or we might go further and use the word *fever*, or at least *latent fever*, even when the temperature was below this norm, provided only that the patient had an infection which under other circumstances might produce an elevation of temperature. Or we might expand the word still more and use it to describe not the temperature at all; but the blood picture which often accompanies an elevation of temperature. In short, the word might finally be applied not to the symptom which it was originally coined to designate, but to every conceivable condition which might on occasion produce that symptom, and also to conditions which might merely accompany the symptom; while at the very same time it might in a contrary sense, be restricted so as to characterize the symptom only under certain circumstances and not under others. In other words, fever would mean fever no longer, but the whole constellation of unusual and pathological mechanisms which as they interacted on one another determined the body temperature. The old clinicians actually wrote of "cold fevers." The confusion here was due to double category: to wit, "fever" as a symptom or finding; and "fever" as a disease process. Similarly, the confusion which has arisen over the psychoanalytic concept of anxiety rests perhaps upon a triple category: "anxiety" as a symptom or finding; "anxiety" as a basic force; and "anxiety" as a disease process.

Now it is clear that to expand the meaning of any one word so as to cover such varied phenomena leads to confusion not merely in the interchange of ideas, but in our internal thinking processes as well; and at the same time, but in another direction, to shrink a word so that it means less than that which it originally characterized, may produce artificial cleavages in natural phenomena which should be looked upon as units. The concept of anxiety has been subjected to both of these distortions.

When such a thing happens, there must be an historical reason for it. I believe that it happened at least in part because Freud recognized the presence and the dynamic power of unconscious anxiety before he appreciated fully the significance of other masked emotions, such as unconscious anger, unconscious guilt, and the like. Therefore, in his original conception of the dynamics of human behavior, a disproportionate rôle was assigned to conscious fear as a symptom, and to unconscious fear as a force. In those early days, almost alone they were the gasoline which drove the neurotic engine; and although Freud later formulated his ideas in terms of a more general concept of undifferentiated unconscious emotional tensions, he never ceased wholly to identify this unconscious, undifferentiated emotional tension with his original picture of fully differentiated anxiety.

Yet Freud's more matured conception of the dynamics of human behavior, as expressed in his concept of the pleasure principle, is by no means so circumscribed and limited, nor so tied to the concept of fear. He identified pleasure with a reduction of something which he called "psychic tension," and pain with its augmentation. This undifferentiated "psychic tension" is a broader

concept than anxiety and includes it. Therefore, a clear understanding of anxiety depends upon a clear understanding of the nature of this underlying "psychic tension."

The soundness of Freud's basic concept of psychic tension could be supported by reference to many well-established facts of modern neurophysiology. From these I have selected the work of Landis and Hunt on the Startle Pattern (*10*); and the work of Pavlov (*6*, *8*), as most relevant to our immediate problem. With these as a point of departure, it is possible to formulate the problem in the following terms: that 1) the basic undifferentiated emotional force which in psychoanalytic literature is usually spoken of as "psychic tension," is the psychological manifestation of an incessant ebb and flow of excitatory and inhibitory processes in the central nervous system; 2) that the physiological basis for conscious anxiety exists specifically when the excitatory processes threaten to irradiate diffusely; that 3) whereas the physiological basis for what is somewhat erroneously called "unconscious anxiety" exists when strong inhibitory processes succeed in thoroughly blocking such a diffuse irradiation of excitation; that 4) apart from this, the underlying ebb and flow has no more to do with anxiety than with any of several other differentiated emotional states, conscious or unconscious; and that 5) for the sake of clarity in our own thinking, and so that we can understand one another and be understood, the use of the term anxiety should again be restricted to its original meaning to characterize the conscious psychic state with which we are all familiar.

II. Pavlov's Concept of Excitation and Inhibition

This use of the terms excitatory and inhibitory is taken directly from the work of Pavlov. The great Russian physiologist demonstrated that the quiet and effective functioning of the central nervous system depends upon a careful balance between concomitant processes which he called excitatory and inhibitory. Lest there be any misunderstanding, it is important at this point to recognize that in his more precise and quantitative experimental work the neurophysiologist uses the terms excitation and inhibition in a stricter sense. Indeed he resents somewhat Pavlov's vague and possibly figurative application of the concepts to the more obscure higher central functions. Nevertheless, for the time being, no better terms are available; and we may follow Pavlov's terminology with reasonable freedom from confusion if we keep it in mind that the words as he uses them are descriptive of two complex processes which almost certainly are not physiological units. Indeed they may have little to do either with the excitation and inhibition of the electrophysiologist or with the excitatory state of Sherrington. To Pavlov, excitation by definition means any change in the general level of central activity which shows itself through a measurable increase in a conditioned reflex; and inhibition means any such change which manifests itself through a decrease in a conditioned reflex.

Recent physiological studies would seem to be opening the way to a more precise understanding of the mechanism underlying these descriptive concepts. Thus Lorente de Nó (*2*, p. 281) has shown how the concept of closed "self-reexciting" chains of neurones (Kubie, *7*) may explain the central excitatory state which is postulated by Sherrington, with its capacity for gradation and summation. And the same author (*3*, p. 241) has demonstrated that these closed neurone circuits can explain the phenomena of central in-

hibition: "The closed chain of neurones may play different rôles according to the number of links that it contains. If the number is small, activation of the chain may result in inhibition, but if the number of links is large enough it may result in sustained facilitation or discharge."

In much the same sense, Pavlov showed that in normal functioning every area of cortical excitation is physiologically circumscribed and delimited by processes of cortical inhibition, that this is essential to the formation of both unconditioned and conditioned reflexes and to the phenomena of thought and attention, and that without this coordinated function of excitatory and inhibitory processes only diffuse and random responses can occur to incoming stimuli. In other words, the evolution of central nervous functions out of a primitive foetal stage depends upon the gradual development of inhibitory processes which circumscribe, restrict, and direct the excitatory processes. Thus Pavlov's picture of cortical function closely parallels Sherrington's picture of Reciprocal Innervation in the spinal cord.

From this working basis, Pavlov showed that minor deviations from the quiet norm occur as part of all normal emotional activity, and that more violent disruptions of this orderly pattern occur in more disturbed emotional states. In laboratory animals for instance he found that under the influence of certain frustrating experiments the circumscribing effect of the inhibitory processes can break down, with the result that the excitatory process bursts out of its accustomed channels and irradiates diffusely over the cortex. Under such circumstances, all conditioned reflexes disappear in a welter of random activity. Pavlov identified such a diffuse irradiation of excitation with a state of pathological emotional upheaval; and when this tendency was established as a chronic state he characterized it as one form of what he called "the experimental neurosis."

Pavlov noted also that certain animals were prone to develop disturbances of this kind under experimental conditions which would in no way disturb others: and at the same time he encountered animals in whom identical laboratory procedures always caused the opposite reaction, namely a diffuse irradiation of the inhibitory instead of the excitatory process, with the production of states of partial or total hypnosis, or of actual sleep. Such animals, despite the fact that they had been through disturbing and frustrating experiments, showed no outward signs of emotional stress. All that occurred in them was a gradual fading out of conditioned reflexes and a slow lapse into sleep. Furthermore, some animals might under certain circumstances react with irradiation of excitation, and under other circumstances with an irradiation of inhibition. Thus it becomes evident that there are three basic physiological alternatives of which the central apparatus is capable: coordinated responses dependent upon an organized balance between excitatory and inhibitory processes, diffuse excitation, or diffuse inhibition.

The existence of these divergent types among laboratory animals indicates that there may be differences in the constitution of the central nervous apparatus which may account for the difference between the individual who is energized by dangerous and disturbing situations, in contrast to the individual who is paralyzed by them. Similarly these facts may shed light on other familiar clinical phenomena. For instance, the fact that new-born infants are readily startled is understandable since it has been demonstrated both by Pavlov and by Minkowski that the in-

fant at birth has developed only to a slight extent the power to elaborate inhibitory processes. For this reason the excitatory process in the new-born tends to irradiate diffusely and to erupt through whatever surrounding inhibition it may generate. To this condition old age often forms a sharp contrast. In the aged, the inhibitory process has been likened to a clot in the nervous system, through which the excitatory processes can barely penetrate; which produces the familiar picture of the old man or woman who apparently cannot be severely startled by anything, and in whom every short-lived wave of excitation merely generates fresh inhibitory processes. Through the years of normal adult life, every gradation occurs between these two extremes: which may perhaps be represented in clinical psychiatry by the contrasting but related syndromes of agitated perplexity and apathy.

If Pavlov is correct, it becomes evident that in the absence of adequate inhibitory processes every excitatory process which arises in the central nervous system must of necessity irradiate diffusely through the nervous system. But this in turn is the neurological basis for all startled states; and since the infant acquires inhibitory later than excitatory processes, it is evident that the startled states are more basic and primitive than organized action. Organized responses are carved out of the startled states largely by the superimposition of patterns of organized inhibition. Pavlov's inhibitory process thus becomes a mechanism of defense against the primitive diffuse irradiation of excitation which produces the startle state. It is identical with what Freud, on the psychological level, has recognized as the "Reiz-Schutz," the protection against over-stimulation.

III. Excitation, Inhibition and the Startle State

The form of behavior which is known as the startle state is thus seen to be the product of a primitive explosion; a diffuse, relatively patternless, uncoördinated irradiation of excitatory processes. In the normal adult, this can occur whenever afferent stimuli, either from without or from within, overwhelm the restricting and organizing inhibitory processes, so that they are unable to keep the excitatory processes within bounds. Such an intensification of excitatory processes is the physiological substratum of Freud's concept of psychic tension, the accumulation of which produces the state of "Unlust." Furthermore, in its original infantile form, this explosive experience is devoid of specific psychological content. The question, therefore, arises what bearing can it have on the problem of anxiety with its active psychological orientation?

Before undertaking to answer this question, it is necessary to discuss what is meant by the so-called startle state. Mass reactions to sudden massive stimuli have been studied both in the human foetus which has been removed at operation, and in the new-born. Although a comparison of the intrauterine activity of the normal foetus with the activity of the new-born infant is possible only to a limited extent, the recent literature on the subject is nonetheless extensive, and has been summarized by Dewey (*4*). Various types of response to massive stimuli have been described, and usually are known by the names of the observers. From among these fragmentary observations two patterns emerge as having a definite relation to our topic: the so-called Moro Reflex (*11*); and the Startle Pattern of Landis and Hunt (*10*). These may be looked upon as the two major

components of what may in general be called the primitive startle state. Their exact relationship has not been worked out, largely because the Startle Pattern of Landis and Hunt has been studied by more precise methods than those which have been applied to the Moro Reflex. According to Landis and Hunt, their Startle Pattern is primarily an involuntary, unconscious, flexor-spasm, involving the face, trunk and axial-appendicular musculature. It is unconscious, involuntary, unchanged by habituation, and lasts less than a second. They considered it to be basic, and persistent throughout life. In contrast to this, the Moro Reflex appears earlier, is primarily an extensor action involving in general the same axial musculature; but with a longer latent period and a slower tempo, and tending to disappear within a few months after birth.

In considering the relationship of these two basic "startle" movements of the body, it is helpful to bear in mind certain simple ontogenetic facts. The foetus throughout most of its intrauterine life is curled into a fairly tight little bundle. Therefore the only rapid motion of the trunk and larger joints of which it is capable is an extensor effort. It can open up, but it can't close up much tighter than it already is in its resting state. Furthermore, in the curled up position, the relative leverage of antagonistic pairs of muscles will also exercise an influence upon the actual movements achievable. These considerations would seem to account for the early predominance of the so-called Moro Reflex with its diffuse extensor movement. The opposite movement described by Landis and Hunt as the specific "Startle Pattern" (*i.e.*, the more rapid reflex shrinking and infolding) could become possible only after the new-born infant had gradually assumed a fully outstretched posture. For our purposes, any more precise analysis of the relationship between these two basic movement patterns is not necessary. We can consider them as a unit in their relationship to the phenomena of anxiety.

Thus in infancy the startled state consists of massive lightning-like flexor movements of the trunk and limbs (the Startle Pattern of Landis and Hunt) or of less rapid but fleeting massive extensor movements of the same major joints (the Moro Reflex). These are brief components of the Startle State as we recognize it clinically; but from these centers of excitatory discharge, excitatory processes irradiate diffusely through the nervous system to produce all of the secondary startle phenomena with which we are familiar.

This secondary irradiation of the excitatory processes brings into further play not only the skeletal muscular apparatus, but the autonomic nervous system as well. Here the pattern becomes more complicated. At times the sphincter functions seem to predominate, at times the extrusor functions. Sometimes the autonomic excitation accompanies that of the skeletal musculature, sometimes the one supersedes the other, and at other times there may be inhibition in the one and excitation in the other. In certain instances, sphincter functions seem to be closely linked to the predominantly extensor (Moro) action (perhaps because massive extensor movements decrease intra-abdominal pressure). On the other hand extrusor functions may become associated with the massive flexor phenomena of Landis and Hunt, since these increase mechanically the pressure within all body cavities. All of these complexities in the patterns must ultimately be understood; but it is only necessary to allude to them here, since they do not affect the basic thesis which we are presenting.

IV. The Startled State, the Conditioned Reflex, and the Phenomenon of Anxiety

These relationships may best be discussed historically and ontogenetically. Under normal circumstances the startled state depends upon sudden rapid and violent changes in external stimulus. Physiologically a constant stimulus especially at low intensities, tends to be relatively ineffective in comparison with changing stimuli. Furthermore, the effectiveness of any change depends not only upon the amplitude and volume of the change, but also upon its rate. Being startled depends therefore upon changes which are both violent and rapid. Such changes, however, can take place only rarely and to a slight degree during normal intrauterine existence. The foetal months maintain the greatest uniformity of proprioceptive and exteroceptive stimuli that is possible in human life. A sudden fall, or a very loud noise (probably perceived by the foetus not as sound but as diffuse vibration, are presumably the only *sudden* things that can happen to the foetus under normal circumstances; and when one considers the number of shock absorbers in which the infant is suspended, one may doubt the suddenness even of these experiences. It is probably not an exaggeration to say that to all intents and purposes the foetus can be startled only gently and rarely (*cf.* Dewey, *loc. cit.* pp. 37–64).

It is equally evident, however, that from the moment of birth the startled state becomes possible and that, as we have written elsewhere (*9*), the infant and the startle state are born together. At birth all of those sensory receptors which either were totally quiescent during intrauterine existence, or else were subjected to a level of essentially constant stimulation, are suddenly stimulated by violent and rapid changes. Light and sound, smell and taste, temperature and touch, the reverberations of the infant's own voice within his head, quick motions, the pangs of hunger, all of these assail him with a suddenness which he never again experiences with comparable intensity. Each slight sensory change, each minute experience, is violent in comparison to the basic monotone of the foetal months. Therefore, for the new-born all experience is in some measure startling: whatever differences exist are only in degree. It is the mere fact of birth, not the process of being born, as Rank thought, which introduces the infant to the startled state.

It is for this reason that for a brief period there is an explosive startle quality to the inception of almost every motion that the normal new-born makes. He even starts to nurse with a snap. This period is fleeting, however, because of the post-natal acquisition of organized patterns of unconditioned and conditioned reflexes. It is almost certain that it is only after birth that it becomes possible for the infant to form conditioned reflexes to external or internal stimuli (*cf.* Ray, *12*).

This is because not all of the prerequisites for the formation even of the simplest conditioned reflexes are present until after the moment of birth. Pavlov showed long since that conditioned reflexes to instinctual needs cannot be formed during states of satiety. For the elaboration, therefore, of conditioned responses to internal stimuli there must be at least some interlude of want, some interval between a state of biological craving and its gratification; whereas in utero, under normal circumstances, the only temporal gap that can occur between desire and its satisfaction is the brief moment it takes for the amniotic fluid to flow down the oesophagous into the stomach. Secondly, as Pavlov showed, there must always be

an interval between the conditioned signal and the unconditioned stimulus. This again is impossible in utero. And finally, as has been pointed out above, the organism must be capable of forming inhibitory processes with which to circumscribe any excitatory process which is set up. Practically speaking, these three essential prerequisites to the formation of a conditioned reflex appear on the scene only at birth.

Before birth, furthermore, the foetus can hardly be said to need conditioned reflexes. Fluctuations in the bio-chemistry of the mother's body are minimized through the buffering action of the placental barrier and his own blood stream, so as to maintain the foetus in a state of maximal constancy. The foetus, therefore, knows a minimum of internal change and he hardly knows what it means to *wait*. Naturally, the moment that the umbilical cord is severed all of this changes.

Even after birth, however, the first conditioned reflexes are still quite primitive; because elaborate conditioned reflexes become possible only during subsequent months as distance receptors gradually come into full play.[1]

Thus we see that at birth three interrelated potentialities of the infant begin to manifest themselves actively and fully: 1) the capacity to form inhibitory processes and by means of them to circumscribe, tame, and direct the excitatory processes in the central nervous system; 2) the opportunity to be startled, and 3) the capacity to form conditioned reflexes.

A conditioned reflex, however, is always a warning signal, a warning of something that is about to happen. The bell may warn that meat is coming; or the same bell may warn of an explosion or a pin-prick. In other words a conditioned stimulus is always a warning signal that an unconditioned stimulus is on its way—an unconditioned stimulus which like the explosion or pin-prick may *increase the central excitatory processes*, or like the meat may decrease them by satiating an instinctive craving. But anything which increases the central excitatory processes is a step towards the production of a startled state; whereas anything which lessens the central excitatory processes or which increases the central inhibitory processes is a step away from the startle state.

We are now in a position to summarize the data upon which our argument stands:

1) Prior to birth, for all practical purposes the foetus can be startled and can form conditioned reflexes only to a limited extent if at all. (It will be seen that these are the two essential prerequisites for any experience of Anxiety.)

2) Immediately after birth the startled state occurs in its purest and least restricted form, playing a part in almost every initial action of the new-born and in response to almost every stimulus, however gentle.

3) This, however, is a brief and transient phase. The organizing process, which Pavlov calls inhibitory, rapidly results in the formation of many specific cortical and subcortical reflex pathways; and as this occurs only stimuli which are intense enough to overcome the restricting inhibitory process can cause the irradiation of excitation necessary to produce the secondary startle phenomena.

[1] In recent years evidence has accumulated to show that certain types of conditioned reflexes (or at least of persistent change) can be produced in decorticated animals and in the cord. (Culler & Mettler, 1, and others.) This is not surprising; but it in no way affects our essential argument. It is well to recall, however, that Pavlov's original investigations of the conditioned reflex were with reflexes which were based upon the tie between instinctual drives and distance receptors. The study of reflexes which are conditioned to more primitive defenses against nocuous stimuli inevitably involved the study of the conditioning process in lower centers. For the purposes of this discussion, however, the emphasis remains on the higher levels of organization.

4) At this point, an additional physiological process enters the picture, namely the formation of conditioned reflexes. These appear with increasing complexity, including conditioned startled responses, as a result of which intrinsically mild stimuli can acquire the power to startle.

5) The conditioned stimulus is always a warning signal of something to follow. Its appearance introduces the infant for the first time to the anticipatory pause, the element of suspense, the gap between stimulus and response in which the psychological process itself is born (*cf.* Kubie *8*). Without this gap the experience which we call Anxiety is not conceivable.[2]

With these facts clearly in mind it is possible to clarify somewhat the relation between the startled states, the conditioned startle reflex, the central irradiation of excitatory and inhibitory processes, and the psychological anxiety state. These inter-relations depend upon a time interval, the essential temporal gap between the warning signal and the response. Any internal or external stimulus, or later any conscious or unconscious idea, can become a conditioned warning that a startled state may occur. Precisely as a light can produce a strong or weak salivation, an appropriate conditioned stimulus must rouse either a gentle or violent anticipatory image of the startled state itself. It is this anticipatory image which we recognize subjectively as anxiety. Anxiety is the Ego's reaction to a state of tension which arises in the nervous system when the Mississippi threatens to overflow its banks—*i.e.*, when excitatory processes are threatening to break through inhibitory barriers to flood the nervous system.

If we examine the experience subjectively, we note the disturbed breathing, the increased tension in somatic musculature, the sphincter tensions, all seeming to reflect dramatically the watchful waiting, the guarding against the diffuse explosion. This description has no relationship to the venerable James-Lange theory.[3] The secondary and tertiary visceral and somatic changes, to which the James-Lange theory attributed so much importance, are only fellow-travellers of the state of uneasy expectation which is created by the inner struggle between excitatory and inhibitory processes.

Any warning process which is associated with conditioned reflexes and conditioned stimuli has a slower pace than the final explosion. All of the delayed or trace reflexes, of which Pavlov writes, take time. They may in fact take a very long time, throughout which central inhibitory processes preponderate, so that no conscious anxiety will be experienced until the end of the interval. Once aroused, however, the process of anticipation may be long sustained; and it is because of this that the state of uneasy anticipation which we call "anxiety" may become a slow motion picture of the startled state itself. Described subjectively it is a state of tense waiting as though on guard.

Physiologically it is a waiting to be startled: it is waiting for the irradiating excitatory processes to burst through the dykes formed by the inhibitory processes. Psychologically it is free anxiety where the conditioned stimulus is not constant or not recognized, and phobic anxiety where it is constant and recognized.

[2] Freud (*5*) also has pointed out the close relationship between the basic processes of thought and of anxiety (pp. 124–125).

[3] In this connection, the case recently described by Dr. Jacob Kasanin before the joint meeting of the Section on Psychoanalysis of the American Psychiatric Association with the American Psychoanalytic Association in May, 1941, is of particular interest. Especially relevant is Case 1, of the patient suffering from an adrenal tumor who experienced all of the somatic components of an anxiety state without the subjective experience of anxiety.

It is clear that the startle pattern itself remains the same whether it is in response to an original unconditioned stimulus of overwhelming suddenness and magnitude, or to an intrinsically innocuous but conditioned startle stimulus. In other words, just as the salivary reflex is the same whether it is produced in response to meat or a bell, so the startle pattern is identical whether it is induced by a loud noise or by a gentle light which has been conditioned to the loud noise. Similarly the phase of anticipation, the anxious waiting for the explosion, is the same whether the initiating stimulus is a real lion, a dream lion, a lion that is represented by an innocuous symbol, or even when the lion represents an impulse to do something forbidden. In short, the response itself remains the same whether it is induced by a real danger, a dream or fantasy of danger, or a symbol of danger; because under any of these three circumstances the reaction depends upon the same internal phenomena.

V. Correlations With Freud's Formulations:

In its psychological implications the physiological conception of anxiety which is described above parallels with remarkable fidelity Freud's last formulations of this problem in the chapter on anxiety in the "New Introductory Lectures on Psychoanalysis" (5). Such a physiological approach to the problem justifies itself if it helps to eliminate some of the obscurities and contradictions which have gradually surrounded this topic during the evolution of psychoanalytic theory, and if it points the way to further investigations of the underlying physiological and constitutional variables.

1) This point of view finds its first useful application in relation to Freud's early concept of the direct transformation of libido into anxiety. To Freud himself, and to all subsequent students, this conception has been troublesome. It has had a mysterious, mystical, almost super-biological aroma. It was dramatic, literary and descriptive; but it seemed to characterize an observable clinical phenomenon which it did not explain.

If instead we consider that undischarged libidinal tensions inevitably build up states of central excitation which lead in turn to the danger of diffuse irradiation of excitation, then in terms of the theory presented here the relationship of libido to anxiety becomes clear at once. There is no need to postulate a mysterious direct transformation of yearning into fear nor to buttress such a theory with deceptive analogies to the degradation of various forms of physical energy into heat, as Freud found it necessary to do. The yearning, whether conscious or unconscious, is accompanied by a mounting summation of excitatory processes which leads to the imminence of an explosive and diffuse irradiation of the excitatory process. This creates that tense expectation of the startled state which we experience as anxiety. Libido as such is not "transformed"; but frustrated libido brings about the accumulation of excitation from which the rest follows automatically.

2) Or let us take the simpler and yet in some ways more difficult question which Freud asks so often, "What is it that we fear?"

If we restate the thesis which is developed in the earlier sections of this paper (to wit, that the state which we call anxiety arises in the interaction between excitatory and inhibitory processes, at the point at which a diffuse irradiation of excitatory processes is actually imminent, or when a reminiscence of such an irradiation is stirred in response to a conditioned stimulus), then it becomes evident that the ques-

tion "What are we afraid of" is in reality a figure of speech. We cannot say that we are "afraid of the irradiation of excitation," just because we experience fear when such an irradiation is imminent, any more than we could say, "We are afraid of a low blood sugar," if in a particular individual a low blood sugar happened to be the basic physiological cause of such an explosive irradiation of excitation. It is never accurate to say that we are afraid of a physiological state. The term fear is in the psychological realm, and the other lies in the realm of physiological facts of which no direct psychological perception is possible, and which are revealed to us not by subjective experience but only by laboratory procedures. It is equally inaccurate and figurative to speak of fear of any special pathogenic organism, or of fear of instinctual impulses out of which excitation arises, or of fear of the repressive forces which may block those impulses. Strictly speaking the ideational content of any moment of anxiety must always represent in some way the whole situation all of the forces which are at work to produce the mounting tension, the opposing inhibitions, and the threatening irradiation of excitation.

This forces us to recognize that all anxiety has at its core what Freud has called "free-floating anxiety." In those situations in which the fear has followed a specific experience, and has become firmly linked in the mind of the individual to this specific experience, then with equal tenacity we attach the inner experience of fear to the outer perception, whether the experience represents real or imaginary danger. In this sense our ideas of what we fear are based on a mechanism akin to projection, a projection which can be completely in accord with reality where we attach the inner experience to a real danger, or which can be entirely fantastic in phobic or delusional states, and which in normal psychology more often represents a composite product of phobia and delusion, masked by reality.

Thus, if a real lion charges at us, the excitatory processes mount with immense speed and threaten to overflow at once, so that we experience acute anxiety. We may call this "Real Angst," or "objective anxiety," to indicate that the lion is real and that we are not dreaming; but this does not alter in any way the inner mechanisms of the anxiety state. In perceiving the lion, and correctly attributing our emotional state to his presence, our explanation of our fear merely happens to correspond to reality.

If on the other hand we have dreamed the lion in a nightmare, and the dream-lion has symbolic significance, it is not strictly accurate to say either that we fear the dream lion, or that we fear the forces for which the lion is a substitute. The "first cause" of the moment of terror, that which starts the ball rolling, is always the process which starts the accumulation of tension to the point at which it threatens to overflow. In a child this might be hunger or thirst: but it is quite misleading to say even figuratively that the child fears this "first cause," *i.e.* the underlying instinctual drive which started the accumulation of excitatory tension.

Thus any frustrated longing can terminate in panic. Freud writes (*loc. cit.*, 5, pp. 119–120) "The libidinal cathexis of the mother as object . . . as a result of repression . . . is transformed into anxiety and now manifests itself in the form of a symptom as attached to the father substitute." It is possible to say the same thing in terms which are more easily assimilable into the structure of general science: to wit that the child who longs desperately and unsuccessfully for his mother builds up states of central excitation which threaten to

spill over—that this creates a state of anxious tension which will then be projected upon any likely obstacle, of which the father is the most important example. But the child's immediate source of anxiety is the Imminent Startle State. It is this which he projects upon his father.

In many of his discussions of this problem Freud recognizes the paradoxes and obscurities which can result from a purely psychological treatment of this problem. He asks if it is accurate to say that one is "afraid" of one's libidinal demands, pointing out that in the last analysis all "fear" of libidinal demands must derive from or be projected onto some external danger, real or imagined. He sees that his own many discussions of the problem of anxiety had repeatedly lost their way in a maze of those adventitious rationalizations of anxiety to which all human beings inevitably are prone. There has been a tendency in psychoanalytic theory to organize the psychological content of anxiety states into an ontogeny or genealogy of fear-ideas, subdivided into hierarchies of original fears and their heirs, arranged in categories, such as basic or secondary, objective, libidinal or moral, or classified according to their focus on the Id or Superego, etc. In this final treatment of the subject, however, it is evident that Freud saw that all of this serves merely to cloud the central issue, and to give rise to the impression that anxiety arises by many different mechanisms, thus obscuring its essential unity as an experience, the apex of a mountain that can be climbed from many sides but whose summit is always the same.

3) This leads directly to a basic issue which Freud left unclear, namely the question of the relationship between anxiety and repression: whether repression creates anxiety, or anxiety repression, and if the latter what sort of anxiety, whether it must be objective, etc. Over the course of the years, as is well known, Freud's position on this problem altered more than once; and in this chapter he again gives it much thought. It seems to us that neither formulation is true, and that a logical fallacy lies hidden in the words themselves. It is inaccurate to say either that anxiety causes repression or repression anxiety. The two are part of an interlocking relationship between excitatory and inhibitory processes. We cannot identify excitation with anxiety or inhibition with repression. But we can identify the anticipation of the explosive irradiation of excitation with anxiety, and the blanketing action of successful inhibition with a final state of diffuse inhibition, which may include repression from conscious psychological perception. The term repression should be restricted to mean that type or degree of inhibition which achieves a repression into unconsciousness. When so used it will be apparent that the important relationship is not between anxiety and repression, but between anxiety and the frustration of libidinal pressure, which may or may not be accompanied by complete repression. It is possible also to have a repression into the unconscious with surreptitious gratification on an unconscious level. In such a case the gratification will discharge the excitation without building up the physiological basis for an anxiety state, unless the gratification itself has become the conditioned signal for the startled state. The psychological state of repression thus is only one part of the total mechanism of inhibition. And it is in the battle with the inhibiting mechanism as a whole that anxiety may be generated, and not with that specific part of it which determines the degree of consciousness of the whole experience.

Repression itself is the name of a

state of affairs, a product of forces rather than a force. A command may cause this condition of repression without the intervention of any anxious moment of forces, as in the familiar experiment of hypnotism. Repression will then manifest itself as an inhibitory barrier both to gratification and to consciousness, a barrier which causes a mounting excitation which in turn leads to the threat of an explosive irradiation whose anticipation we have identified with the Anxiety State. But here again it is the impact between excitation and inhibition which produces the anxiety. *Repression* is only a name for the process which determines whether the struggle was conscious or unconscious.

Or conversely, powerful taboos may be backed up by threats, so that even a faint premonitory hint of desire may meet counter-inhibitions which raise a storm of anxious anticipation, even before the excitatory process has gone very far, with resulting repression. (Freud has this in mind when he speaks of the "fear" of loss of love as a motive for repression; but he means inhibition in general rather than repression in particular.) Here once more it is evident that both the repression and the anxiety are symptomatic end-products, derivatives of the same set of forces. These psychological end states (*i.e.* Repression or Anxiety) cannot strictly be regarded as forces themselves. Therefore, they cannot accurately be said to have causal relationships to each other: and to say that repression causes anxiety or that anxiety causes repression is merely short-hand for saying that the one symptom has preceded the other chronologically in a specific sequence of forceful events. Thus, if the mounting excitatory states approach close to the point of diffuse irradiation before repression occurs there will be a moment of conscious anxiety before inhibitory forces dominate; and we are likely to fall into the fallacy of saying that the anxiety which preceded repression caused it. And contrariwise, if inhibitory processes forbid and prevent the simple gratification of libidinal wishes, and force them to accumulate tension unconsciously, we cannot claim that it was the repression into unconsciousness which caused the subsequent anxiety, when in reality this is the result of the total inhibitory processes.

It must be borne in mind that in the struggle between excitatory and inhibitory processes, under certain circumstances the one will dominate cerebral functions, and sometimes the other. These two alternative end results of the same struggle are possible. Which result occurs depends upon many variable factors, not all of which are known, some of which are psychological or experimental, some physiological and perhaps constitutional. If the excitatory process threatens to overflow we have anxiety. If inhibitory processes dominate we have repression. Neither, however, can accurately be said to be a primary cause of the other; although the forces which produce either may assist in maintaining the other.

4) Finally, let us turn to the striking parallel between this point of view, physiologically propounded, and its psychological enunciation by Freud in the chapter cited.

On page 114 he speaks of the attitude of watchful waiting in objective anxiety, calling it "anxiety preparedness;" and he describes the "increased sensory and motor tension." He says, "Out of this the anxiety reaction arises." And then as he develops his thesis on page 117 he speaks of anxiety "as though the symptom were created in order to prevent the outbreak of a state of anxiety." Clearly this is very close to our formulation, that anxiety is an anticipatory warning which occurs in the effort to

protect against the outbreak of the basic startle state.

This becomes even clearer on page 129 where he writes, "What is feared, the object of the anxiety, is always the emergence of a traumatic factor, which cannot be dealt with in accordance with the norms of the pleasure-pain principle." Or again, on page 130 "I have in mind the fact that all along we are dealing with questions of relative quantities. *It is only the magnitude of the excitation which turns an impression into a traumatic factor*, which paralyzes the operation of the Pleasure Principle" (italics mine)—"Anxiety as the direct effect of a traumatic factor, secondly as a signal that a traumatic factor of this kind threatens to recur."

These last statements paraphrase almost perfectly the point of view presented in this paper. Implicit in them is a recognition of the significance of the intensity of the stimulus which produces the startled state (*cf.* such terms as "relative quantities," "magnitude of the excitation which turns an impression into a traumatic factor," etc.). Implicit also is the recognition of the alternative fates of the startled state as it overflows into diffuse excitation, or becomes walled in by inhibition and thus "paralyzed." And finally there is an implicit recognition of the significance of the conditioned reflex mechanism, implicit in that pregnant last statement in which Freud characterizes anxiety "as a signal that a traumatic factor of this kind threatens to recur."

In working out the concept described here, we began purely from the physiological data that are now available. It was only when all of this had been put together that we turned to Freud's recent formulations to see to what extent we converged upon them, paralleled them, or deviated from them. It is gratifying to find how closely this conception and his approach each other. This adds to one's confidence in the validity of each.

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CHRONIC FATIGUE*

WENDELL MUNCIE, M.D.**

THAT PATIENT may consider himself fortunate who, in his time of adversity, can appear before his physician with precisely definable and localizable complaint. From this one fact alone, his chances for accurate diagnosis are measurably increased. With all due respect to surgery, I think it may be said that its glory rests in no small degree on this same fact. Actually when the presenting complaints are not so clear, the surgeon is apt to turn the case over to the internist. The internist by contrast is so accustomed to the vague complaint that he breathes a sigh of relief when a patient does have clearly definable and localizable difficulty. To this baffling problem he brings the modern paraphernalia of diagnosis, calling on all the basic sciences for assistance. Among these basic diagnostic aids we must include psychology, and it is as a practicing psychologist, *i.e.*, a psychiatrist, that I have enjoyed the collaboration of my internist colleagues in exposing the structure and dynamics of such human problems.

A large share of the internist's clientele presents complaints which in the final analysis reduce 1) to such terms as emotions and affects, some more or less closely linked with, and expressive of basic physiologic states of malaise, and 2) to attitudes toward life, in general, or in some particular aspect. It can be shown that these familiarly but loosely used terms, "emotion and affect," are open to adequate definition in terms of the actual behavior, and that the objective demonstration of how they work offers the surest means for introducing therapeutic influence into the situation.

In my experience the three most important conditions of the sort under discussion are 1) anxiety-tension states, 2) depression, and 3) chronic fatigue. It is the last that I wish to discuss.

Patients suffering from chronic fatigue complain of being "tired,"or "weak," or "exhausted." These terms, used rather loosely, are not synonymous, as can be easily shown by careful history taking. They roughly divide into two categories: 1) those in which there is a paralysis of initiative, with a variable degree of fatigability on effort, either mental or physical; 2) those in which spontaneity and desire still persist, but in which there appears to the patient to be an inadequate peripheral effectiveness. "I want to do things but my body won't perform," is the usual statement. Common experience differentiates tiredness, the result of effort, from weakness, the forestaller of effort. Practically speaking, however, the terms do become interchangeable, because if tiredness exists or relentlessly recurs over some while, then effort is forestalled because of its sure anticipation and is consequently avoided. To date these nuances of the complaint, tiredness, weakness, exhaustion, etc.,

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are only suggestive of the need for further research, and without practical effect on the diagnostic problem.

Confronted by such complaint, there is nothing to be done short of a methodical survey of the patient's bodily and mental economy. This search may be productive or relatively sterile. But even when abnormalities are discovered, there always remains the vital element of judgment as to their actual clinical importance. The actual difficulties involved will be illustrated later.

It is well to recognize that such complaints are to be found in the descriptions of practically all important human diseases, so testifying to their relative non-specificity and labelling them as among the common reactions of human maladjustment. Nevertheless, fatigue or weakness, of a severe chronic and disabling sort, looms largest in relation to the following, singly or in combination:

1. Endocrine-metabolic disorder, especially in hypothyroidism and hypoadrenalism.

2. Post-infectious states, of certain sorts, notably after influenza, undulant fever, and the dysenteries.

3. Emotional states and attitudes, lumped traditionally under the rubric, neurasthenia.

As a matter of fact mixed states are probably the most common, at one time one factor being the more important, at another time another.

Let us look at the exact status of each of these situations. First, concerning the endocrine-metabolic disorders. In my interne year I gained a transient fame among my colleagues by virtue of diagnosing before death a case of Addison's disease and having it confirmed at autopsy. Since then such effective work has been done on the essential metabolic disturbance in this disease and in its alleviation that now every senior medical student has a far firmer grasp of the problem than any of us had, in its less serious as well as extreme forms. Suitable tests for the adequacy of the sodium metabolism furnishes sure diagnosis, and pellet implantation of desoxycorticosterone leads to justifiable optimism in the future of the Addison's victim.[1] The exhaustion of this condition is strikingly alleviated by the treatment.

The case is complicated, however, when the symptoms are only mildly suggestive of Addison's disease, such as low blood pressure and low serum chloride content, and when improvement takes place with the drug, but after some weeks of such treatment there appears to be no need for its continuance. In such case may we reasonably conclude that there is a transient Addison's syndrome which is self-righting with only a little help? If so, what could be the provocative cause? It reminds one of a somewhat similar situation in the adaptation of the body to increased weight achieved with the help of insulin injection. In many such cases there is no weight reduction after the insulin is discontinued. In our files is the record of a patient whom we have known for fifteen years, tall, asthenic, scrawny, hypotensive, a victim of obsesssive doubts and ruminations. On numerous occasions efforts have been made to fatten him, and with the most arduous regime have achieved practically no success. Two years ago an internist colleague discovered the moderately reduced serum chloride content, which with the hypotension suggested hypoadrenalism. With adrenal cortex extract, the blood pressure rose, the chloride rose to normal value, and he gained 22 pounds weight. After a few months of this regime the drug was stopped and he continued to maintain his new level until hot weather came, when with increased

[1] Additional treatment with cortex extract may in some cases be necessary.

sweating the chlorides fell again and further treatment with sodium chloride ingestion and with adrenal cortex extract was required. The suspicion arises that he presents a condition in which there is maintained a very fine balance in metabolic adjustment, easily overthrown by one or more disturbing factors, *e.g.*, dietary, and heat regulation through sweating. (See Fig. 1.)

A somewhat similar situation exists in the case of thyroid deficiency states. In many instances of gross deficiency as determined by the basal metabolic rate, the blood sugar and the blood cholesterol, thyroid extract administration produces amelioration of symptoms. Yet we have the frequent experience of cases with profound fatigue with only moderately low basal metabolic rate (*e.g.* minus 25), and a blood cholesterol level of 300 mg. per cent, which respond rapidly in these items to thyroid extract administration but show very slow improvement in the general performance. But if improvement does set in, it may be unnecessary longer to give thyroid extract, the metabolic status apparently being self-maintained. The questions may be asked: What are the origins of this apparent thyroid deficiency? Is it actually causative of the chronic fatigue, or is it only another evidence along with the fatigue of a third and causative factor? Or is it secondary to the chronic fatigue and inactivity? There seems no sure answer to these questions with the information at our command.

In both hypothyroid and hypoadrenal states there is always the issue of critical judgment on the significance of the laboratory findings. It is easy to fall into the error of assigning undue clinical significance to moderate variations in the metabolic functions, and time and again we have seen reliance placed on endocrine therapy with too complete neglect of other factors, especially the

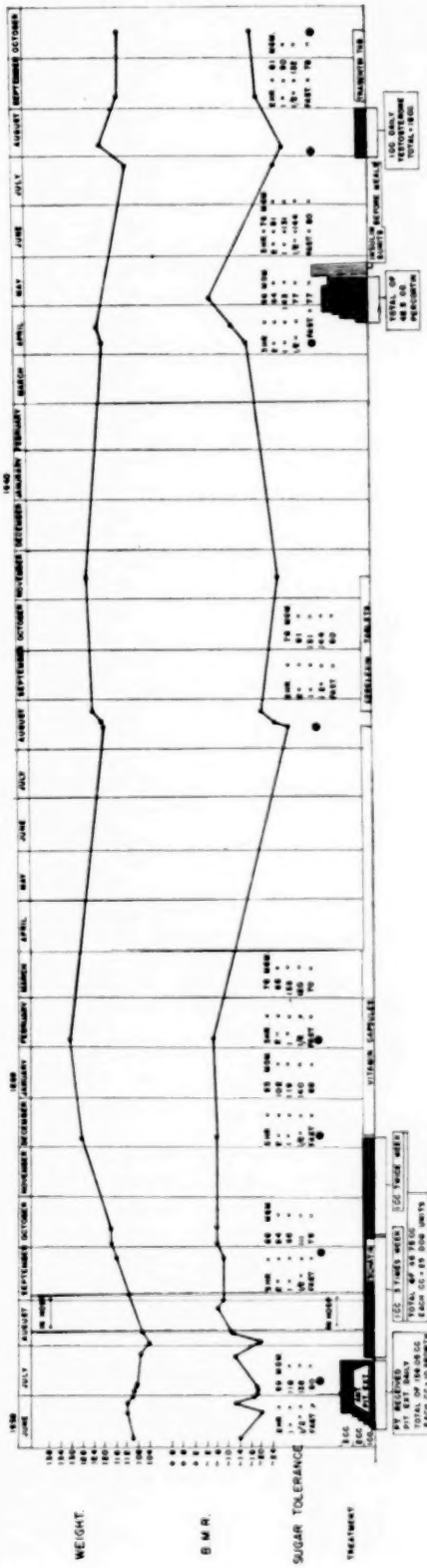

FIGURE 1.

psychogenic ones to be later discussed. Treatment at psychiatric hands has often been made unnecessarily difficult by the injudicious labelling of such conditions in exclusive terms of endocrine anomaly, an hypothesis which the patient accepts as dogmatic truth and uses for the purpose of thwarting further investigation into personal issues.

In contrast to these conditions in which the pathological factors are sometimes clear and detailed, and generally at least suggestive, the situation in regard to the post-infectious fatigue states is most obscure. Common experience shows that fatigue is the immediate aftermath of certain infections, notably influenza, the dysenteries, and undulant fever, and with anorexia, weight loss, insomnia, and low spirits constitute a well known syndrome. How long may such fatigue continue after the acute infection and still be linked with the latter in close sequential relation? And what relation does it bear to the severity of the original attack? For example, a patient who complains bitterly of exhaustion six months to one year after an attack of influenza of no great severity at once arouses the suspicion of a spurious insistence on the relationship of the fatigue and the infection. Yet what proof is there for or against such a claim? In the case of influenza we deal with a notoriously debilitating agent, which, however, may leave no evidences in blood chemistry and metabolic processes of its disastrous work. Even the diagnosis of the original acute attack is often shrouded in thick ambiguity. In spite of this, practically everyone has experienced the "flu" and its consequences. There seem to be no sure criteria for judging such a relationship, and in my view a considerable leniency is at present desirable. At the same time, it would appear obligatory to remain alert to the significance of contributory factors, notably of psychogenic issues.[2]

Undulant fever bids fair, in my experience, to become the most commonly imputed cause of chronic fatigue. This is perhaps due to the general upsurge of interest in undulant fever among internists, and the finding of positive agglutination reactions in a surprisingly large part of the general population. Both these facts are not lost on the public, always avid for the latest medical news. The same unsolved problems hold here as in the case of influenza. Neither can the relationship be judged by the amount of residual agglutinins in the serum. The whole problem is all the more confused when, as usual, the patient presents himself with the complaint of chronic fatigue, and with positive agglutinins in the serum, but with no history of acute mellitensis infection. We deal then only with circumstantial evidence which must be checked by the most careful treatment, guarding rigorously the treatment regime to prevent prejudicial exploitation of certain items by the patient.

Recently I saw in consultation for an internist colleague a young married man, aged twenty-two, who, belying his appearance of being in robust health, had complained for two years of severe exhaustion, and of irregularly recurrent bouts of fever up to 102 degrees, of aches in the neck and back, and of short-lived fits of unaccountable depressive moods. The illness began in his last year of college, and has dogged him since, interfering with his work and with his pleasures. His mother developed the same symptoms a year before his appeared, and she still suffers. Both were raw milk drinkers and in both there were positive serum reactions indicating Brucellosis. They were both treated with vaccines. For the first months of his illness he

[2] Recent work of J. S. L. Browne and P. Weil suggests a new method of approach to this issue in the excretion of cortex extract in the urine in toxic states.

felt weak and had subjective difficulty in concentration, but he managed to graduate with honors. He seemed doubtful of the adequacy of his work adjustments with his father's business, but quite rightly drew the conclusion that he had never been in the optimal condition for any work adjustment.

In this case, a review of his past showed the overt evidence of a stable personality, free of neurotic traits. There were no contributory evidences pointing to neurotic complaining at the time of examination. The negative results of the psychiatric survey combined with the clear cut diagnosis of Brucellosis, and the presence of fatigue as one of a residual syndrome of related features rather than as an isolated symptom seemed to point rather conclusively to the post-infectious character of the complaints.

In the case of the dysenteries, the problem is somewhat similar, but complicated by the presence of chronic infection in a latent form, as with the finding of amoebic cysts. How important is such a finding in evaluating the chronic fatigue reported to have followed on the acute infection?

We have seen a man in the forties, previously healthy and stable, who suffered an acute febrile attack of dysentery in Central America, lasting perhaps a week. The reputed consequence of this infection six months later was fatigue so great from the simplest effort, either physical or mental, that it was impossible for him to carry on his work. Physical examinations at our hospital were negative, and neither was any noteworthy psychogenic material discovered. Further, the patient's subjective difficulty in thinking was not corroborated by the methods at our command. On the chance that he might be suffering from amoeba histolytica infection, he was given a course of carbasone. After some more months of enforced rest with a very gradual and partial return to his effectiveness, he was examined at another clinic and amoeba histolytica cysts were discovered for which he was treated with Viaform. Later a subacute or chronic infection with some tropical bacillary dysentery organisms was discovered and treated with vaccine and bacteriophage. This was thought to be causative of his fatigue, but thirty months after the original attack he was able to work full time only with considerable personal discomfort. Yet in another six months he appeared to have made a good recovery and was able to work full time.

In such a case, judgment on the significance of the infection for the long invalidism must be suspended. Furthermore the failure of the psychiatric inquiry to unearth pertinent facts must be taken with a grain of salt, since the opportunity for a study, comparable in thoroughness with that of the physical status, was not afforded us.

To sum up the questions arising from the cases of chronic fatigue allegedly following infection:

1. How long after an acute infection may the fatigue syndrome be legitimately attributed to the infection?

2. What is the relationship between the severity of the acute process and the degree of fatigue?

3. What is the relation of blood serum agglutinins, increased sedimentation rate, cystic forms and other evidences of infection to the degree of fatigue?

4. How may infectious sequellae be differentiated from latent and chronic infection?

5. How may treatment be best handled as a check on the diagnosis?

These questions, the careful internist must answer critically as best he may with the limited facilities at his command. Without a reasonable view of these factors, the psychiatrist is at a dis-

tinct disadvantage in his share of the work on the problem. Often enough the question must be left wide open, and the final opinion arrived at by weighing the probable values of the various factors in the light of their relative authenticity as determined by the best test methods.

So far I have discussed the physiological bases for the complaint of chronic fatigue. The mental factors are no less important. These arise from two different circumstances:

In the first place the human notoriously uses for his own personal purposes physiological phenomena, to build up emotional states and attitudes toward life in general. For example, a patient may utilize the awareness of his heart action through the presence of extra systoles, themselves of no great importance to his well being, to promote and underwrite a state of progressive anxious invalidism and social parasitism. Likewise, a patient may take advantage of a tendency to easy fatigue on any of the bases previously described to build an attitude to futility which paralyzes effort, and leads to invalidism.

In this sort of situation adequate history and examination reveal the physiologic bases for fatigue as endocrine-metabolic insufficiency, post-infectious debility, or other appropriate chronic difficulty, as anemia, hypertension, etc. verified or suggested. But beyond this there is the clear evidence of a secondary elaboration of a philosophy of life best described as defeatist, of such degree that effort is no longer attempted.

In our records is the case of a young man in the early thirties, who was bedridden for three years before coming to our clinic last year. He was known to have a low basal metabolic rate and had been treated with thyroid extract by thoroughly competent physicians with only transient and indifferent success. He had taken to bed through the conviction that rest was his only salvation, and this had reached the point where he was resting in anticipation of the effort which he never was quite able to get himself to make. He lived on his inheritance and so managed to get along without actually calling on the charity of strangers. Repeated examinations at our Clinic confirmed the hypothyroid status, and he again was placed on thyroid extract. At the same time an attack on his attitude to life was made by means of personality study and the encouragement to socialized effort with definite goals within his immediate reach, to increase his self-confidence. After about four months this patient was leading an active life, and was doing volunteer work several hours daily in the medical school library. He left hospital and has continued to do well. (See Fig. 2.)

In this case—and it could be duplicated—it seemed to us that the patient was utilizing a mild hypothyroid state for the elaboration of a defeatist attitude to life, itself more destructive of his effectiveness than the endocrine disturbance ever was. In fact, at the time he left hospital at his best performance his basal metabolic rate had slumped slightly despite an increase in the thyroid medication. It is not surprising, therefore, that the earlier efforts at treatment by thyroid extract alone had been insufficient, and that apparent cure came only with simultaneous treatment of the personality disorders.

In another case, a married woman suffered an acute infection with undulant fever. During the convalescent period her husband suddenly died from some heart affliction. They had married rather late in life, she was childless, and she had been completely wrapped up in him. With his death there fell over her a lack-luster attitude to a continuance of living which expressed itself in terms of the principal sequel to the undulant

fever, namely, tiredness. And five years later she was still "tired."

This woman, whom Fate had cruelly treated, failed to find within herself the development of, and submission to, a philosophy of futility and of martyrdom.

These two cases illustrate the utiliza-

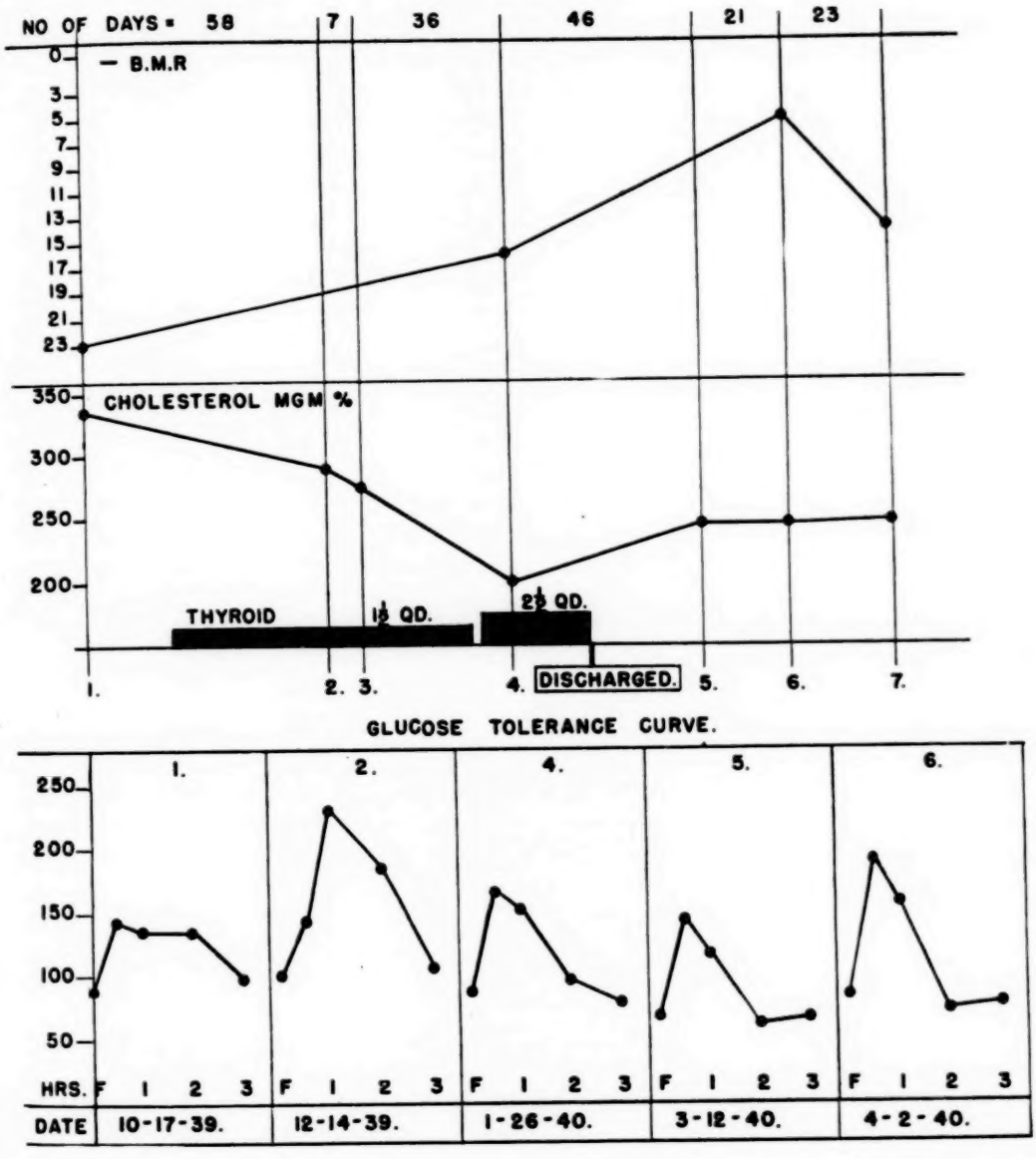

FIGURE 2.

emotional resources for the effort at rehabilitation. This failure in part may be attributed to her actual debilitated condition at the time the blow fell. But its continuance and growth to invalid proportions could only be the result of the tion of physiological abnormality, from whatever source, for the elaboration of powerful emotionally tinged attitudes to living, in which, however, the emotion is not openly expressed but implied in the physiological complaint. This is

one variety of neurotic development.

The second variety of neurotic development featuring tiredness rests on a different basis. In the first place, the most thorough examinations fail to reveal any notable abnormality. Secondly, a survey of the patient's life circumstances and of his personality make-up show positive evidences of the telltale affective state best described as "tired of it." The patient's use of "tired" for "tired of it" is no conscious prevarication or effort at misleading. The use arises very naturally from the general law underlying the verbal expression of emotional states. Our words expressive of emotion result almost entirely from the metaphorical change of concrete sensory experience to the abstract use deemed descriptive for the emotional state. For example, the word "feeling" itself carries a double meaning, of concrete sensory experience, and the metaphorical emotional reaction; similarly "hot under the collar" means the total emotion of angef by metaphorical change from a crucial part of the sensory experience of anger; "cold terror," "hot shame," testify to the same meaning change. Actually the experience of boredom, monotony, futility, "tired of it" carries with it the "tired" feeling, as a part of the whole reaction. This "tiredness" is superficially not unlike the fatigue from effort. The neurotic element of the performance resides in the patient's rigid insistence on the reality of the part reaction as the whole reaction. This amblyopia for the larger implications of the term stems from the personal dynamics of the case—essentially a poor effort at life adjustment.

Neurotic fatigue may be of the primary sort with its own origins, or secondary to other personality reactions. Some of the most important findings in the primary developments are:

1. A childhood lived in strict dependence on the love and open generosity of parents, giving rise to a parasitic attitude, become fixed by habit.

2. A defective development of goals and vital interests in living. Either the patient has far off goals with none intermediate and more easily attainable through which to gain intercurrent satisfaction; or he has only intermediate ones with nothing more distant and vital, compelling him to consistent effort, and he becomes satiated with the inadequate day-to-day living.

3. A monotonous regime, unpunctuated by either any major triumph or disaster.

4. Imitation of the same reaction in parents or others.

In the secondary developments are to be noted:

1. Chronic anxiety or fear, leading to a feeling of tiredness or exhaustion at the necessity for always being on guard against threats to the personal security.

2. The feeling of being under perpetual competition and strain with resulting anxiety and then fatigue.

Neurotic fatigue is to be differentiated principally from the fatigue in depressive states, which is really more of a lack of initiative consonant with the general and diffuse feelings of sadness and melancholy which are the hallmarks of the reaction. One of the most practical items of differential diagnostic importance is the morning-evening variation of depressive fatigue, regularly worse in the morning, better with effort and best in the evening after the day's activities. Neurotic fatigue, by contrast, is usually less pronounced in the morning after sleep, and worse after the day's effort. There is no time or opportunity now for an extensive discussion of depressive states, but it should be remembered that the fatigue of depression is most commonly mistaken for neurotic fatigue. The careful differential diagnosis is important for treatment purposes.

Treatment in cases of neurotic fatigue must be counted a most difficult task since in general the patients come for assistance only after every known sort of therapy other than psychotherapy has already been tried, and they are thoroughly disillusioned. They are often not a little resentful also since it eventually becomes clear that effective treatment in the long run demands personality change and reorientation. To our view that the patient's personality determines his "tiredness," he counters with the assertion that his "tiredness" colors his personal performance. The management of such an impasse demands the highest technical skill, which at one and the same time must succeed in arousing the active curiosity of the patient in the elaboration of the problem in its entirety, and so exposing the personality issues, but also in preserving the self-esteem, and in pointing the way to possible better and more satisfying living. These are cases for the psychiatrist—not just any psychiatrist, but that psychiatrist who has proven his competence in dealing with neurotic evasion, substitution, and self-deception, and in pointing out more effective methods of adjustment to life.

To summarize, chronic fatigue appears in its most blatant form 1) in relation to gross endocrine-metabolic disorder, 2) as an item in certain post-infectious states, notably after influenza, dysentery, and undulant fever, and 3) as a neurotic reaction arising either from the elaboration on one of the preceding forms of certain emotionally tinged attitudes, or exclusively as the expression of personality maladjustment featuring aimless drifting, monotony, boredom, chronic futility feelings, with precursors reaching back to the early years of life and fixed by habit.

Examination of any case of chronic fatigue must take into account at least all these items, and the treatment responsibility must then be allotted to internist or to psychiatrist or to both as a joint effort, depending on the balance of the factors at work. These are very difficult cases, and the treating physician is himself in danger of becoming "tired out" with the effort at their amelioration, but in the process he will have no difficulty in finding ample verification of the few things I have been privileged to bring to your attention, and he may eventually be able to find adequate answer to some of the perplexing questions here raised.

A HISTORICAL REVIEW OF PSYCHIATRIC TREATMENT*

OSKAR DIETHELM, M.D.**

A REVIEW of psychiatric treatment in its historical development demonstrates that treatment has always been dependent on the status of medicine at the time, on leading psychological concepts, especially the concept of the relationship between body and mind, and on current cultural influences. In order to verify this principle, it seems best to consider psychiatric treatment from the period of Paracelsus to the present time. When, in the sixteenth century, medicine began to be studied and practiced as the science of nature, factual observations began to take the place of dogmatic statements. In the works of all the great physicians of the sixteenth and seventeenth centuries, case material which added to the knowledge of various types of psychoses was included. This gradual accumulation of material formed the basis for the development of psychiatry in the last quarter of the eighteenth century. Treatment was empirical according to the general medical knowledge of the physician. The greatest danger was the tendency to generalize individual observations into broad principles which then dominated psychiatric treatment for generations or even centuries. The curative effect was taken on its face value and there was no need to understand the psychological factors involved. In many therapeutic procedures fear was the unrecognized dynamic factor which caused the patient to lose hysterical symptoms, to break through a catatonic stupor, or to control himself in his manic excitement or in states of anxious agitation. This lack of psychological analysis is to be expected in even the greatest physicians of these centuries. Psychological thinking had not yet been established but developed in the seventeenth and eighteenth centuries, following the formulations of Locke, Berkeley, and Hume. On the other hand, much good psychotherapy, based on common sense, psychological observation, and sympathetic understanding was advocated and practiced.

The introduction of chemistry into medicine led to the uncritical and frequently fantastic use of medication on psychotic patients. Paracelsus(*17*) recommended the use of the metals, especially mercury and sulphur, for practically all psychoses. Their use persisted for two hundred years. Other metals were added to psychiatric treatment according to their more or less widespread usage in medicine in general and according to current theories. Insufficient evacuation of bowels, gastrointestinal complaints, and symptoms of dehydration were made the basis for treatment by cathartics and emetics. These remedies were considered indicated by the classical Greek and Roman writers because of the presence of black bile. The theory of the etiological importance of black bile dominated psychiatric treatment until far into the seventeenth century. In the eighteenth century, the theories of the gastric-bil-

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ious etiology of the Vienna school formed a modern basis for treatment by emetics and cathartics. At the end of the nineteenth and in the twentieth centuries, toxic factors justified drastic cathartics, colonic irrigation, and even colonic resection. In considering the mistakes due to generalizations or faulty theories, however, one must also keep in mind that the clinical pictures of psychoses change greatly according to the general health conditions. For example, mercury must have been valuable in the sixteenth and seventeenth centuries because of its effect on syphilis, then an unrecognized etiological factor in psychoses. The wide-spread dysenteric disorders must have played an etiological rôle in many delirious reactions and, more frequently, a transient rôle in chronically psychotic patients. The same might be said of typhoid fever and intestinal tuberculosis.

As early as the sixteenth century, observations have been published on the beneficial effect of transient infections on chronic psychotic patients (*19*). These observations were utilized freely in the eighteenth and early nineteenth centuries when artificial skin infections were produced through setons, and similar procedures. At the end of the nineteenth century, this type of treatment, based on the same clinical observations as in the sixteenth century, led to the unsuccessful treatment of schizophrenic illnesses; whereas in the twentieth century it led to the successful treatment of general paresis, proving that empirical treatment has its value when used critically.

When blood-letting became a fashionable remedy in medicine, it was applied freely in all kinds of psychiatric disorders. This procedure was proposed on various grounds by the greatest physicians of the time. The climax was reached at the end of the eighteenth century in Broussais' theories of irritation (*6*). Blood-letting by venesection, cupping, and leeches was indicated as an antiphlogistic or weakening treatment. These therapeutic procedures persisted until the latter half of the nineteenth century. Based on Broussais' theory, skin blisters and local infections were introduced as counter-stimulants.

The introduction of anatomical studies was of little therapeutic value in psychiatry. Careful brain studies in the eighteenth century aroused disappointment because of the generally negative results and did much to strengthen the opinions of those who, in the early nineteenth century, proposed an entirely psychogenic theory for all psychoses and considered psychotherapy the essential tool (*12*). Although Gall's studies and theories had great influence in psychiatry, the phrenological school (*21*), which was prominent from the beginning to the middle of the nineteenth century, did not affect treatment in any specific way. The progress of neurohistopathological studies, especially in the last quarter of the nineteenth century, was accompanied by a therapeutic nihilism causing the best men in psychiatry to withdraw to the laboratory and to consider the "taking care" of patients the essential therapeutic function. Only in recent years has the advance of brain surgery given the histopathologist a basis for therapeutic suggestions and theories.

The findings in other parts of the body besides the brain in post-mortem examinations have caused much discussion and corresponding therapeutic suggestions since the eighteenth century, but practical results were negligible. As a rule, these findings were used to confirm theories of the localization of psychoses and current empirical treatment.

Pharmacological treatment has, at various times, played as important a

rôle in psychiatry as in medicine in general. It might be stated that every drug which had been found efficacious in physical conditions was immediately tried in psychiatry. It has been previously mentioned that cathartics have been used freely since Greek medicine. In the seventeenth century, calomel and various salts began to be highly advocated. Opiates had already been recommended by Paracelsus. During the seventeenth and eighteenth centuries their use increased greatly, sometimes for gastrointestinal symptoms, but more frequently to induce rest and sleep. In the nineteenth century, the opiates came to be used to control depressive agitation. Various medications to stimulate the sluggishness of the depressed patient and to change his depressed mood to one of cheerfulness have been tried for centuries up to the present time. As might be expected, ether was given to control excitements in the middle of the nineteenth century. These treatments were always considered symptomatic aids and not etiological therapy. It might be mentioned that, for several centuries, attempts had been made to distinguish the etiological and symptomatic treatment of psychoses. When ipecac was added to the drugs of the seventeenth century, it soon became the leading emetic to remove supposed gastric poisons. At the end of the nineteenth century, the recently discovered apomorphine became the favorite emetic, not to be used for this quality, but because of the sedative effect which accompanied nausea and vomiting. It was the leading tool to control obstreperous and excited patients in a period when corporal punishment, which had been considered of therapeutic value in psychiatry until the end of the eighteenth century, was recognized as barbaric.

The introduction of alkaloids in psychiatric therapy was rather judicious from the beginning (seventeenth century) and was, therefore, found moderately valuable. Stramonium was soon given up in psychiatry, whereas morphine and hyoscine have remained (*22*).

The use of camphor has been interesting. Its so-called antispasmodic qualities have made it seem indicated for epileptic disorders and for various types of excitements. At the end of the eighteenth century, digitalis took the place of camphor (*3*). The beneficial results were obtained with toxic amounts, leading to nausea, and with it a so-called narcotic effect.

When cinchona (quinine) was introduced in the seventeenth century and found beneficial for malaria, it was recommended highly for intermittent psychotic reactions. There is no evidence in literature that these reactions had any relation to malaria and the conclusion therefore seems warranted that the treatment was based entirely on a superficial analogy. Again, best results were obtained through nausea caused by high dosage.

These statements on somatic treatment and treatment by drugs seem most condemnatory, but such a censured opinion would be hasty and too harsh. They illustrate what has happened in the history of medicine from the fifteenth to the eighteenth centuries —the collecting of clinical and anatomical observations, the organization and grouping of this material, treatment based on trial and error with intelligence applied on an increasingly sounder and wider theoretical basis.

Most important is the gradual change of attitude to human problems, to the individual, and to life in general. This change in philosophy affected treatment in medicine, especially in psychiatry. In the sixteenth century, magical concepts still influenced medicine, and demonology was widely accepted. Even when superstition subsided and psy-

chotic individuals were considered patients and therefore the concern of the physician and not of the court or the church, it was difficult for a physician to know how to approach such a patient. He did not have a formulation which could be used as a basis for understanding. The Cartesian philosophy was of aid in the field of reason, but not in the field of disordered reason. Descartes' separation of body and mind was an obstacle to the scientific approach to personality disorders. It was possible to understand delirious disorders to some extent, but not those disorders in which no changes in the brain could be found. The physician was, therefore, forced to look for therapeutic clues in the course of the illness of the individual patient, and had to be guided by these empirical data. It is understandable that the physician eagerly reached for any treatment offered. The varying course of the individual psychiatric disorder, the inexplicable exacerbations and improvements, the circular and recurring types of illness, transient physical symptoms, all confused the pathological picture and made it impossible for the physician to distinguish between coincidence and causation in treatment. The influence of emotions, especially those of fear and hope, were not known; and suggestion was not yet recognized.

The greatest contribution of philosophy to medicine, and especially to psychiatry, comes from the great English philosophers of the eighteenth century and from the related French and German philosophers. Although Locke in 1704 had already formulated the necessary psychological principles, it remained for Hume (1711–1776) to offer a scientific psychology which, together with the contribution of French philosophers whom he influenced, made possible a scientific formulation of mental disorders. The great importance of Locke lies in his wide influence on the thinking of the eighteenth century, especially concerning the value of the individual and his freedom. The resulting freedom of thought and expression was of the greatest importance to science and medicine; the new orientation to the individual, to society, and to the state was necessary for the creation of psychiatry as a medical discipline and for the treatment of the individual patient.

Because of the philosophic-psychological development in the eighteenth century, the physician became interested in the behavior of his patients. The emotional reactions observed in their patients, and, to some slight extent, the subjective descriptions of their emotional reactions, stirred the interest of the physicians. After the middle of the eighteenth century, the influence of emotions on body functions was treated in monographic form by various authors. The outstanding books were those of Falconer (1784) (*11*), Scheidemantel (1787) (*20*), and C. J. Tissot (1798) (*23*). In the natural progress of the study of emotions, physicians became increasingly concerned with the mind-body problem. The need for a modern formulation was felt. At the end of the eighteenth century psychiatrists were divided into two groups: those who believed exclusively in somatic etiology as opposed to those who believed in mental etiology. The controversy between the two schools lasted through the first half of the nineteenth century. However, in the eighteenth and early nineteenth centuries there had already appeared psychiatrists who recognized the unity of the personality and offered a psychobiological formulation which would be quite acceptable today. It is of interest to note that those who believed in a psychobiological unit were largely under the influence of the German philosophical school of romanti-

cism. The German philosophers of the nineteenth century and the "neoromantic" school of philosophy of the twentieth century have greatly influenced the development of the current psychobiological concepts, especially on the European continent. There is another interesting parallel in the rôle which physiology has played in the study of the influence of emotions on the body. In the eighteenth century, Haller's contributions to physiology were important in offering a possibility for understanding the relationship between emotional and physiological functions. In the twentieth century, the work of Pavlov offered the necessary stimulation and leads for further investigation.

During the eighteenth century, the philosophers became interested in mental disorders and, as psychology belonged to philosophy, they felt justified in claiming the theoretical aspects of psychiatry for philosophy and in outlining the psychotherapeutic procedures. These contributions proved of little value, although the German philosophers of the period of Kant exerted considerable influence on contemporary psychiatrists. The most valuable contributions to psychiatric theory and treatment during the eighteenth century came from those physicans who were well trained in internal medicine and physiology, and who, influenced by current philosophy, were keenly interested in the individual and in humanitarian principles. Only by considering this background can one appreciate the contributions of Chiarugi (*7*), Daquin (*9*), Pinel (*18*), Tuke (*24*), Arnold (*1*), and many of the others who helped develop scientific psychiatry at the end of the eighteenth century. In evaluating this development, too much stress has been laid on the change in hospital treatment, and sufficient notice has not been taken of the complete change which occurred in medicine with regard to psychiatric illnesses, their study and treatment, and the theories involved. The dramatic change in the Paris hospitals was merely an incident which has been emphasized by circumstance.

The desirability of psychiatric hospitals was recognized in the late middle ages, but little progress was made until the middle of the eighteenth century. This late development can be understood when one considers the cultural setting. The previously described change of the eighteenth century, that of the obligation of the state to the individual, was necessary to create the soil in which psychiatric hospitals could flourish. The treatment in the hospital depended on the current medical and philosophical concepts. For example, in order to understand the brutality of attendants toward patients, one must consider the whole atmosphere of the hospital. Fear of the violence of patients dominated everyone. Violence had to be subdued by force and the patient frightened into submission. This was considered an important psychotherapeutic procedure. Restraint was necessary for protection. In addition, it was observed that enforced immobility calmed the patient for prolonged periods of time afterwards. This observation was explained by the decreased blood supply to the brain during immobility. (Excitement was explained by hyperemia for which some evidence had been found in pathological studies.) Nausea had a similar calming effect. Rotatory machines to which the patients were bound were used to produce therapeutic nausea. It was recommended to keep patients in cold rooms in winter-time because psychotic patients were supposed to be less affected by cold and pain than normal people. Pain was indicated to stimulate withdrawn and negativistic patients. These erroneous notions persisted until physiology and psychology were in a

position to study sensations. Diets were supposed to be poor in quality and quantity for therapeutic reasons (*10*). These few points may be sufficient to demonstrate that the existing "maltreatment" was considered correct treatment according to the medical concepts of the time. No doubt, unscrupulous owners of private hospitals used these means to decrease expenditures, and cruel and unintelligent attendants and physicians were readily led to abuse.

The cultural changes of the eighteenth century brought about a treatment which considered the rights of the individual patient, his psychological and psychopathological reaction, and his physical condition. However, this progress was quite slow. It took years to overcome erroneous conceptions and to have the modern theories accepted. It will always be thus with the progress of medicine—many are unable, or unwilling to accept changes in treatment; the individual physician's empiricism will dominate over broad principles; the practitioner's suspiciousness towards the investigator and his theories make him a conservative. During the entire nineteenth century, the problem of hospital organization and treatment was gradually solved to the extent that now general guiding principles have been accepted. Mechanical restraint was considered necessary for protection until Hill's (*15*) and Conolly's (*8*) demonstration of non-restraint treatment in 1830–40. The problem of restraint, however, has not been solved. There are still many psychiatric hospitals where one or the other form of mechanical restraint is used. At the end of the nineteenth century, chemical restraint, made possible by the discovery of various alkaloids and sedatives, was considered preferable. Hydrotherapy, in the form of prolonged baths and cold or warm wet packs, has been found to be a useful substitute. Despite the intensive use of hydrotherapy, little is known about its physiological action, and it is still impossible to state how much relaxation is due to physiological, and how much to psychological factors. The usefulness of the prolonged warm bath in excitements was recognized by the Greek physicians. During the period of the sixteenth to eighteenth centuries, the main hydrotherapeutic procedures were the surprise bath; *i.e.*, to cause therapeutic fright by pushing the patient suddenly into a cold pool. This treatment was based on an observation of Van Helmont (*14*), demonstrating empirical treatment at its worst. Later, cold showers and jets of cold water were used on the head, preferably shaved, of excited patients to combat hyperemia of the brain. The present use of hydrotherapy links up with the development of balneology during the second part of the nineteenth century.

When, at the end of the eighteenth and the beginning of the nineteenth centuries, the state recognized its obligation to psychotic patients, much thought was given to the grouping of patients. The main principles of occupation were recognized in the eighteenth century (*9*, *18*, *24*). Occupational therapy was developed along different lines. Many physicians felt it necessary to stress that occupation should be used only for distraction, while others urged the use of work which needed to be done in a hospital, or which was of value. The fear of causing hospitals to develop into work-houses has not yet subsided and still impedes the sound development of hospital life. In some hospitals, individual work suitable to the patient's interests is believed to be essential. In other hospitals, the individual patient's obligation to the group is considered of importance, and teamwork is the recognized therapeutic need. This latter type of occupational therapy seems to work well at present in German hospitals

where the patient's obligation to the group and state corresponds to the current leading philosophy. Only in recent years have psychopathological studies been undertaken to make occupational therapy correspond to the changing needs of the patient.

For the last 120 years the question has been undecided as to whether separate hospitals should exist for patients with good prognoses and for chronically ill patients. Should there be hospitals for treatment as well as hospitals for custodial care? The treatment of chronic diseases had not attracted much attention until the nineteenth century. With the progress of medicine, physicians became able to keep patients alive much longer than previously. In addition, with the prolongation of life, new problems of the late-life period began to confront the physician. It is, therefore, quite possible that the whole question of different types of psychiatric hospitals will have to be reviewed again. It is characteristic of modern thinking to replace the term "custodial care" by the term "treatment of chronic illnesses."

In contrast to the attitude of the early eighteenth century, when small hospitals were considered preferable and relatively large amounts of money were spent on beautifying the buildings and grounds, the twentieth century psychiatric hospital is guided by the principle of economy and safety. Through economizing, hospital beds will be available for a larger group of patients. Modern living conditions and changing cultural aspects make for hospital treatment of patients previously treated at home. Frequently, safety has been stressed too much, giving the hospital the aspect of a jail.

In the nineteenth century, the desirability of having psychiatric divisions attached to general hospitals became recognized. In recent years, an increasingly close working relationship between the departments of medicine and psychiatry has led to therapeutic advances. The patients in a psychiatric unit should now receive as good physical studies as in a medical pavilion. The personality reactions of the physically ill patients on the medical service are studied and treated by the psychiatrist. Psychosomatic treatment, or psychobiological treatment as it might be called, is fast developing.

It is frequently not recognized how far treatment in psychiatric hospitals has advanced during the last 120 years. The good results obtained are primarily due to improved general medical treatment. Tuberculosis and infectious diseases are now under control. Dietary changes have brought about marked improvement in chronically ill patients and have furthered the recovery of excited and depressed patients who would have died previously. Cases of gangrene have practically disappeared from these hospitals. Recently developed endocrinologic and chemical treatments are still being disputed and results cannot be evaluated yet in a historical review. These treatments illustrate the fact that progress in psychiatric therapy depends on progress in medicine in general. Explanations and theories must therefore correspond to those of physiology and medicine.

Psychotherapy has developed scientifically in the last quarter of the eighteenth century. The first great contribution was the demonstration of hypnosis by Mesmer (*16*). Hypnosis had been known in old cultures and its therapeutic possibilities have been vaguely recognized since the fifteenth century, but it did not become a therapeutic tool in medicine until Mesmer introduced it. This progress in medicine became possible and greatly influenced psychiatric thinking because the work of Haller in physiology and the development of electricity brought the dynamic

concept into medicine. Another possible contribution to psychotherapy by Heinroth (*13*) did not bear fruit as it might have because it was linked up with ethical problems at a time when psychiatry was just freeing itself from the domination of philosophy. Heinroth in his psychotherapeutic discussions dwelled at length on the patient's responsibility to health and life, and on guilt feelings due to his failure to live up to his standards. One hundred years later, Freud formulated the same ideas and they were soon widely accepted. During the elapsed time, psychotherapy had progressed slowly. The theory and practice of hypnosis was developed considerably through the efforts of the English (*5*) and French (*4*) and suggestion was recognized as the important dynamic factor. Mesmer's teaching influenced German philosophers of the early nineteenth century and, through them, others who, at the end of the nineteenth century, offered formulations on unconscious mental activity and on the dynamic unity of the person. Further progress in treatment was the outgrowth of the work of Herbert Spencer and the development of genetic psychology, with its resulting interest in child behavior and its great stimulation toward a genetic-dynamic psychiatry.

Through the influence of French psychologists and of French and German philosophers who were interested in psychology and biology at the end of the nineteenth century, the concept of the person as a unit became accepted and took its place in psychotherapy during the twentieth century. Sociology developed out of philosophy and psychology during the latter part of the nineteenth century. Since the end of the nineteenth century, psychiatrists have considered the psychiatric problems of large groups and paid attention to principles of mental hygiene. Previous interests along the same lines had only a transient influence (*2*). The increasing alcoholism in British colonies and in the United States led to publications on alcoholism at the end of the eighteenth century. Waves of suicides gave much concern in the eighteenth and nineteenth centuries. The efforts of individual psychiatrists were of only limited effect, until sociological thinking and a psychodynamic and genetic psychiatry had developed. However, even now, mental hygiene has not yet been linked up sufficiently with general hygiene and public health.

A historical attitude seems to me most essential if psychiatry wishes to progress as rapidly as possible. The history of psychiatry demonstrates that progress has been linked to the status of medical science, philosophy and psychology, and to general culture. From an interest only in psychotic patients, psychiatry has become a full-fledged medical discipline. Its obligation is to study the person in ill health, whether the person be an infant or child, an adolescent, an adult, or an aging or senile person. The person is studied as an individual with attention to all possible physical and social factors. Mental hygiene becomes recognized as part of general hygiene. The history of medicine in general and of psychiatry teaches us to be cautious in using the terms etiologic versus symptomatic therapy. The definition of etiologic treatment depends on the theories in which one believes and the knowledge of the times. A historical review of psychiatric treatment fosters a sound therapeutic optimism. It demonstrates the great progress made and offers a hopeful vista of the future.

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PSYCHONEUROSES IN WAR TIME

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THE INTRODUCTION to this monograph recounts the personal experience of one of the authors (Dr. Zabriskie); this is followed by a critical review of the literature.

A commission as Contract Surgeon was received in the middle of August 1917 and orders were issued to proceed to Fort Niagara to examine the Second Officers' Training Camp in order to eliminate the nervously unfit. This was a busy, active camp made up of eight hundred student officers and there were only six weeks in which to examine them. A rough and ready method of holding a short interview with fifty men was established at which it was determined whether there were any tremors, tachycardia, sweating, flushing or any other obvious signs of nervous instability. In this way it was also possible to obtain some information on organic disorders. From this preliminary examination selections were made for more extended interviews which took place at night. Information was also obtained from conversations with the instructors at which time the purpose of the examination was carefully explained; the lines of students waiting for vaccination were carefully scrutinized and likewise the sick-call line at night.

After this assignment, orders were received to proceed to New York to assist the Elimination Board at Camp Mills and while on this work orders were received to proceed to Camp Beauregard, Alexandria, La., where it was my task to organize an elimination board for the 39th Division. Similar proceedings with modifications were instituted and a board of eight men was able to examine the entire Division. Only in rare instances was an I.Q. attempted, and for the most part only the more outstandingly unstable cases were eliminated. Statistics will be found in Vol. 10 of the Surgeon General's Medical History of the War. At this camp a special psychiatric ward was established for soldiers who needed hospitalization. There were a number of cases of delirium from time to time, as a large number of soldiers were stricken with various infectious disorders; there were psychoses of the degenerative and functional type, and it was found essential to have a psychiatric unit in which they could be hospitalized and properly disposed of.

In February, 1918, orders were received to join the Sanitary Train of the Third Division and to report there as Division Psychiatrist. The Division assembled at a small town in northeastern France not far from Chaumont. The period with the Third Division furnished the only intimate contact with war neuroses or organic diseases of the central nervous system. During the training period contacts were made with regimental surgeons and the methods and reasons for the evacuation of the psychiatrically unfit were carefully explained. Rounds were made in the Field Hospital, several clinics were held whenever time permitted. In this way two cases of sporadic meningitis were discovered, the nature of which was not determined at that time. Replacements

were examined and during this examination one soldier with marked atrophy of both shoulder girdles appeared as a replacement. He had been sent overseas as a convalescent from a myeloencephalitis.

The period of training was abruptly terminated in May, 1918, and the Division was hurriedly sent to the Marne, just south of Chateau Thierry. Before the battle of the Marne the time was occupied with examination of prisoners, examination of replacements and a consultation service with medical officers of the line or sanitary train, whenever requested. In this way many psychiatrically unfit, chiefly replacements, and a few neuroses that began as anxiety states before the impending battle, were evacuated to the rear. One feebleminded soldier afforded an amusing diversion; on the day before the Marne offensive by the Germans, a regimental surgeon from a machine gun battalion appeared at the office and put in a request to have one of his soldiers examined. He gave a history which was corroborated the next day by members of the soldier's company—that the patient had never been able to properly adjust his gas mask, he was so unreliable that they could not depend on him to deliver water, food or messages at any advanced outpost, and his crowning mistake had been to lose a wagon load of food and two mules for more than two days in the woods. Arrangements were made to have him sent to the Field Hospital. However, the offensive began that night and in the confusion and turmoil of the battle he was lost sight of. Six weeks later, while passing through a town where the same machine gun battalion was at rest, the author made inquiry concerning this soldier, and was told that he had become the company hero. During the two days of the fierce barrage the Germans put down he seemed to bear a charmed life; he was electrified into a sense of responsibility that made him the most dependable man in the company, who always got food, messages and water through from one machine gun nest to another. He went through the barrage numerous times and during the battle seemed to behave and act like a perfectly normal individual. As soon as it was over and the company was at rest, he reverted once more to his feebleminded type.

After the offensive started a stand on the triage line was taken to select the neuroses and other neuropsychiatric cases and those of pure exhaustion, for more intensive study and treatment. They were all sent to a tent set aside for this work, and there they were examined in detail. The acute exhaustion cases were observed for forty-eight hours. They were given hot drinks, either a hot bath or sponge, and kept absolutely quiet. At the expiration of forty-eight hours it was usually not difficult to esimate whether they could be restored to duty in a few days or whether a longer period of convalescence was indicated. In the latter instance they were tagged with a diagnosis and their destination indicated. This of course was Base 117 at La Fauche. Strange to say, their safe arrival did not in many instances depend upon the proper indications on their cards, but rather on the instructions of the dispatching officer who was an engineer, not a medical man. Suffice it to say that many of these cases never did reach BH 117, while it took us many weeks to track down others. During the first ninety-six hectic hours, during which the Germans were thrown back from the Marne, no attempt was made to retain and treat other than the simple exhaustion cases. These recovered for the most part rapidly enough so that they could be returned to their units within three or four days.

The more severe anxiety states, with hyperthyroid symptoms or gastrointestinal upsets, appeared too complicated and time-consuming at that time to be retained. This was also true of the hysterical conversions of which, by the way, I personally saw very few. No attempt was made to retain the neuroses with severe tremors, tics or other motor disturbances, for the same reason.

The first impression of the exhaustion cases was that of real exhaustion, both physical and emotional. They were undergoing a new, terrifying experience of open warfare under intense artillery fire for four days, no sleep, little food and practically no water. The dehydration effects of these states were quite remarkable and it was equally remarkable as well as gratifying to observe how quickly they regained body and circulatory tone when the water balance was brought to approximately normal conditions.

The advance along the Vesle River was slower, things in general were much quieter and it was possible to make more detailed studies of the psychoneuroses which came along at about the same rate as elsewhere. It was possible to do more for the anxiety states, and the simpler hysterical tics, tremors and aphasias. In the two or three weeks that followed it was possible to treat by suggestion and the explanation of the conflicts, whenever they could be elicited, the simpler types of psychoneuroses, and return them to duty. By this time the safe arrival at BH 117 was practically certain, the trip was not too long and little or no time was wasted over those showing strong resistance to therapy. Several rather acute confusional states with delirious productions were encountered. They appeared to be of the exhaustion type, and although they recovered fast enough to be quite clear at the end of ten days, it was deemed unwise to send them back to the line before they had fully regained their strength, and so they were evacuated to the rear for further convalescence.

By far the most disappointing group was comprised of officers. They were all extremely unstable with a poor constitutional equipment. Their resistance to return to duty was usually very obvious and formed a barrier to suggestive therapy that was impossible to surmount in a short time. By far the most stubborn resistance was encountered in a regular medical officer who exhibited anxiety symptoms rather mild in character, and a stammer that appeared only when we discussed his return to duty. In spite of this he begged to be returned to the front line. This was done, but after the second relapse it seemed hopeless and he was evacuated to BH 117.

A good example of what unmistakably was the great emotional factor in some of the exhaustion cases occurred among the stretcher bearers. These soldiers endured all the hardships and privations of the combat troops but were compelled to repress their aggressive instincts because they were not equipped with arms. Their only weapon was the stretcher. More than one related his sense of frustration because of this duty, which allowed his fears to preponderate, as all aggressive instincts were repressed.

Our division never had experience in trench warfare and no neuroses produced under these conditions were seen.

There was one extremely dramatic incident of mass suggestion. It concerns the hasty return to the rear of many soldiers presumably gassed. They were rushed back in trucks to the field hospital where some remained and others were sent further to the rear. I saw them rolling along in trucks—animated, talkative, not prostrated or ap-

parently very sick. Not one of those examined showed bronchial signs of gas, nor did the mucus membranes of the upper air passage appear other than slightly reddened. The conjunctivae were somewhat suffused but no more than was often seen under ordinary shell fire. It was afterward ascertained that no gas had been put down by the enemy in the regions where these soldiers were. It afforded the Gas Officer however a fine opportunity to display his skill in organization, and so the entire group were put through the steps necessary for gassed soldiers, and then evacuated. Unfortunately no opportunity was afforded to follow up these cases to learn how many gas neuroses were established and conditioned by this procedure. This incident occurred during the first few weeks of the occupation of the Marne area while the Division was operating under the Fifth French Army.

This may have served as an introduction to a much larger number of gas cases which occurred later on after the battle was in full swing and the Germans were retreating along the Vesle River. Again a large number of soldiers were returned diagnosed as gas casualties. They continued to come in until the number reached five hundred, and again no clinical evidence of gas inhalation was seen. The Division Psychiatrist had a better opportunity to investigate these cases, and the average case showed definite effort syndrome with coughing, frequently husky voice and several cases of aphonia. There may have been some gas shelling in this instance, but it was desultory, at best, and never were there large amounts of gas put down. These conditions always began in the same way; whenever a soldier was subject to bombardment the alarm of gas would be given and gas masks would be adjusted; then they began to drift into the dressing stations complaining of the above mentioned symptoms. It was felt that there had been a sharp contrast in the quality of the fighting at this time—that it was more leisurely and occurred with more or less inactive troops who were holding a position. They were in a comparatively monotonous atmosphere without the dramatic qualities of the first rush and it gave them time to think and appreciate the dangers and the distress and discomforts they were exposed to. It was further accentuated by disappointment at not being relieved in the line as soon as they had been led to believe would be the case.

The next battle experience was during the St. Mihiel campaign, where the Third Division did not participate until the battle was nearly over and no time existed to set up any workable organization.

After this campaign, orders were received to report to the Third and Fifth Corps and then to the First Army as consultant. During this time there was very little chance for active clinical work. The time was occupied in visiting the various Division Psychiatrists, helping them obtain whatever assistance was possible from their superior officers, acting as consultant to the Advance Base Hospital at Souilly and visiting the neurological hospitals Nos. 1 and 3 in the advance zone.

After the armistice orders were received to report at Evacuation Area No. 1 at Savenay to act as consultant neuropsychiatrist to that district. Here again the duties were mostly administrative, but they did include an effort to examine and make an adequate record of all the peripheral nerve injuries in the center. A large and, for the most part, very effective team of neuropsychiatrists was placed at my disposal for this purpose and the entire center of twenty-five thousand beds was rather thoroughly searched in a comparatively

short time. With few exceptions the cases were properly examined and recorded. A small society for clinical neurology and psychiatry was organized and meetings were held regularly every week. The last assignment was at Tours, where the evacuation of the psychiatric units in base hospitals was supervised.

In reading the literature on neuroses in the last war, the period between the wars, and the present war, one is impressed by the progress that has been made in the understanding of this type of illness. At the same time, it is evident that this knowledge is as yet in the hands of a comparatively small number of individuals, so that there is still a good deal of misunderstanding in regard to the subject. As Culpin wrote in August, 1940, "There was a state of ignorance which the younger generation can scarcely realize. Besides ignorance there was prejudice and obscurantism, against which a long battle had to be fought. Little of these now remain, but in spite of much writing in the journals, and the existence of a body of well-trained young men, there still remain a diagnostic and therapeutic inertia which would not be tolerated in any other sphere than that of the neurosis" (*8*).

The subject is of particular importance today because those men who were engaged in working with the neurotics in the past war, and who made studies of the situation both in this country and abroad, felt that there was a good deal of wasted time on the part of the soldiers and additional expense to the governments because of lack of adequate handling of the cases as they occurred, and also often lack of treatment all along the line, either because of ignorance or insufficient facilities. According to the Official History of the World War an analysis of 1,043,653 British soldiers showed that, on occasion, neurosis made up 34 per 1,000 and sometimes 40 per thousand of the casualties evacuated home; in the Canadian forces 24 per 1,000 were nervous and mental casualties; in the American Expeditionary Force the total number of admissions of enlisted men suffering from functional nervous disease during the period from April, 1917 to December, 1919 was 9.5 per 1,000, or 32,983 men. Looking at this another way, about one-third of the unwounded, or one-seventh (*41*) of those discharged from the British army after the last war were found to be permanently unfit on account of functional neurosis or mental disease (*41*). Neurosis makes up the bulk of the functional casualties resulting from war, for experience both then and now shows that there was no increase in psychosis (*30*, *41*) as a result of war. In England by 1918, 32,000 pensions had been granted for functional nervous disease and in 1921 this had increased to 65,000. It has been pointed out that these figures are much smaller than the total number of functional cases receiving pensions, since many are grouped under other heads, as, for example, the group "effort syndrome" patients, who had in 1921 35,000 pensions (*31*, p. 170).

One aspect of the situation which differs from the last war is that the civilian population is also exposed to war hazards which may greatly increase the incidence of functional nervous illness, since it is impossible to separate the constitutionally susceptible persons and keep them in a more protected environment. This is important not only as far as the individual case is concerned but also because nervous illness developing in one individual may lead to a group reaction (*54*).

In the last war much time was spent discussing shell shock. At first it was thought by a good many—Sir Frederick

Mott, Oppenheim and several French writers—that actual injury to the nervous system was the cause of the condition which was later called "shell shoc." It was felt that some were killed immediately, others died as a result of injury, and that the rest had organic damage which caused a variety of symptoms. Gradually, it became apparent that in a large majority of the cases of so-called "shell-chock," there could not be irreversible organic damage. These cases were often cured by psychotherapy. They were found to develop in men who had not been exposed to exploding shells or any outward trauma which could have produced changes in the nervous system. The symptoms were not present in the men who had been severely wounded. In a given group exposed to the same trauma, the illness developed only in certain men, and the type of nervous illness occurring among officers was frequently different from that in the ranks. It became a generally accepted fact that the term 'shell shock' usually described cases of functional nervous disorders which were similar to those that had been seen in civilian life, although the coloring was different. The term 'war neuroses' has been used more in the later literature.

What, then, are the conclusions as to the etiology of the war neuroses? Wittkower writes (*52*): "The majority of psychiatrists believe that, given sufficient emotional stress, neurotic symptoms may appear in anyone, and that the existence of neurotic symptoms in civil life predisposes to their reappearance in an increased and altered form in war." T. W. Salmon, also, in writing of the last war said (*42*): "The basis of war neuroses, like that of neurosis in civil life, is an elaboration, with endless variation, of one central theme—escape from an intolerable situation in real life to one made tolerable by the neuroses. The soldier loses a function that is necessary to continued military life and so avoids a successful adaptation to war."

Writing after the evacuation of Dunkirk, Sargant and Slater say (*45*): "An acute shell shock, a type of case not previously seen by me, came to the Hospital. The previous men had shown constitutional deviations and instability." These "acute cases of war neuroses on the other hand demonstrated that men of reasonably sound personality may break down if the strain is severe enough," and "the stress required to produce a breakdown in such a personality was of an altogether different order from that which they would be subject to in ordinary life." A picture like this suggests that the environmental situation itself may have a good deal to do with the bringing on of a neurotic reaction, and a number of writers have stressed this side of the situation. It is also said that functional cases produced by war seldom have a pure etiology, so that one may look for several factors. Fatigue as a result of sleeplessness, and exertion, poor diet or physical illness may decrease the individual's resistance, and reduce him to a state where he loses his control. It is generally believed that in the army, or war industry, excessive fatigue results from long hours of work under tension and lack of change. It is a great waste of man power and renders the man more susceptible to the development of nervous upsets. The total output of work is not increased, and may be decreased (*19, 50*). "Tension caused by whistling of bombs, auditory and visual sensations especially under conditions where there is no chance for action," has been mentioned as a factor (*31*). Inactivity, loneliness and lack of change, as experienced on ships at sea or in long periods in trenches, are important contributory factors (*7, 31*). In spite of all the stress and strains of the

environment that have been mentioned, all men do not break and those that do so, break in varying degrees and with different pictures.

Many feel that heredity plays the main part in the development of war neurosis, and that some individuals are so constitutionally unstable that they will break under the least strain. Hurst says that the chief predisposing causes of war neurosis are congenital nervousness, a previous nervous or mental breakdown, concussion and chronic alcoholism (*22*). Among the United States soldiers admitted to hospital with war neurosis, there was a history of neuropathic stock in 40 per cent. There was a higher incidence of hysteria, stammering, etc., among negroes and of "neurasthenia and psychasthenia among whites" (*29*). In the United States army, 65 per cent of neurotic soldiers had positive family and personal histories and average nonneurotic soldiers had only 46 per cent of positive history. Miller, after a survey of the whole subject, believes that the results are far from conclusive and that while small group studies seem to indicate the importance of positive family history, studies of larger groups do not appear to justify a very definite conclusion (*31*, p. 11).

While we may conclude that there is difference of opinion as to the effect of environmental factors, and of heredity in the development of war neurosis, there is no such disagreement as to the part played by the internal conflict of the soldier, and it is this that we find stressed again and again in the literature. In other words, the main etiological factors in war neurosis as in all neuroses, are psychological.

In the volume on Neuropsychiatry of the Medical Department of the United States Army, it is said that there is a conflict between the self-preservation instinct and the more social urge to 'carry-on,' and that when these two drives become about equal, almost any little thing will upset the balance and a neurosis will develop. Then fatigue, minor trauma or emotional experience may precipitate the disorder and swing the balance in that direction.

Russel (*41*) doubts whether conflict is necessarily unconscious in all cases of conversion hysteria. He writes: "Freud's theory is that hysteria is due to frustration of instincts. The resulting mental conflict converting itself probably through conscious or subconscious processes of association into physical disability is, I have no doubt, true up to a point, but my studies lead me to doubt the unconscious conflict, or at least we should not put too much emphasis on it." He thinks that "War neurosis may develop where the stress and strain on the instinct of self-preservation is relatively too great or too prolonged, or in suggestible people." In other words the individual is conscious of conflict. The first gets well in a few days. The second, so-called shell shock, created serious problems in the last war. He says that the fundamental reason goes far back in the individual's history but that these cases came most in battalions where the officers showed lack of understanding and poor discipline.

Wittkower (*53*) believes that war forces individuals into situations which stimulate their own repressed aggressive impulses and may produce anxiety or complete break. The personality most likely to break is described as self-centered, over-conscientious, with lack of sociability and lack of affection for relatives and friends. He points out that life in the trenches exposed the soldier to danger of death which constituted a threat to excessive self-love, also that exclusive association with men tended to arouse their latent homo-

sexual tendencies. "Under such strain the individual rapidly regressed to a narcistic level of development, leading to a state of infantile helplessness, and to a need to be pitied and cared for like a child." He adds that among soldiers the main sources of strain are danger of death, guilt over killing, increased responsibility, separation from family and sexual deprivation.

Another conflict is described in the United States Army volume on Neuropsychiatry (*29*); a conflict within the individual brought about by his newly acquired military discipline. The writer points out that in our army the tradition of conduct in general, the association with active military life, is very recently acquired, "So recently that they are only superficially grafted on the officer's personality." Hence, there was need for continual inhibition and repression in order to maintain the new tradition under difficult circumstances, especially in the front line, where he had to use his newly acquired technical knowledge to care for himself and his men. "Under the strain of fatigue, exhaustion, worry, etc., the faculty of conscious inhibition was temporarily lost and officers acted for the time being as primitive instinctive pieces of machinery and during the period of semi-automatism, confusion, or haze, the beginning of the neurosis of the anxiety type was laid. In some this did not happen in an acute manner; a series of smaller less important incidents brought the officers in exactly the same condition." The writer goes on to say that from then on the conflict continued. There is further repression of conflict, and emotion tends to be separated from experience. Dissociation ensues and there emerges the "Clinical picture of a state of intense anxiety with the external evidence in the way of facial expression, depression, apathy, loss of sleep, dreams and even the objective appearance of fear, tremor, rapid pulse, vasomotor reactions in the face of complete unawareness and lack of understanding on the part of the patient of what is really at the basis of his discomfort."

"The Battle experiences repressed and in a sense partially forgotten, tend to express themselves by freeing their emotional content or spinning themselves out in dramatic and terrifying dreams. There is present, then, the evidence of fear and even terror, without being related to either actual experiences themselves, or even to actual memories of such experiences. In this state there develops a series of conflicts which must be regarded as hardly being conscious in some instances and wholly so in others. These seem to have been the more usual" (*8*). Conflict was noted between the desire to go back to the front and the negative desire or wish for self-preservation (*52*). There was also conflict between tradition and training of an officer and desire to escape from line of duty (*41*). Conflict arising between desire to avoid danger and discomfort of the front and to preserve ideas of duty, valor, etc., and family, personal, social and class standards. Conflict between the desire to escape and the feelings of inadequacy in a military sense of the officer in command of his men—conflict between the wish to go forward and the wish, expressed or not, to go back to former conditions in the United States, conflict which had reference to events of similar types in pre-war experiences. There were many others but these were very common in base hospital No. 117.

Dr. Riggs wrote (*38*) on war neuroses, "A man, usually somewhat hypersensitive to his own emotions, often with an essentially timid personality, finds himself in a position of extreme danger, or if not actually in the position of danger, on the way toward it. His

ideals of honor, of service and of loyalty push him on toward the goal from which his instinct of self-preservation, through the emotion of fear, is doing its best to hold him back. Through misconception he has learned to consider fear as synonymous with cowardice. His own essential self-esteem excludes cowardice from his idea of self. Indeed, as a matter of fact he *knows* he is not a coward. Therefore, it is impossible for him, in the face of this prejudice, to recognize or acknowledge the presence of fear. Fear, however, is what every normal man must feel when in danger, and furthermore, this emotion, like all emotions, is not just a mental state, but is actually also a bodily state, a state of mobilization of bodily forces, a state of preparation for immediate flight, and it has very marked and noticeable physical signs. Among these are a rapid and an irregular heart, tremor of the muscles, a dry mouth, and disturbances of stomach and intestines. One man cannot help being disturbed by these physical disorders, which, largely because they are neither understood nor recognized, become exaggerated. They finally constitute a bodily condition which becomes the focus of his fear—fear of breaking down physically he can recognize and acknowledge without prejudice to his character. The emotional state becomes even more tense, its physical symptoms more marked, until they dominate the picture, and he is actually disabled by disordered or paralyzed bodily function. The deadlock of the conflict between his ideal of service and his instinct of escape is incidentally broken by the condition produced by the emotion, for that condition makes it physically impossible for him to go on, and much against his will he is *ordered* to the rear—a case of shell shock."

R. G. Gordon (*17*) attempts an explanation of the physiology of fear. Given the stimulus, say a lion, the image on the occipital cortex leads to flight. The impulse not only passes forward to activate the voluntary muscles, but down to the thalamus, hypothalamus, and endocrine changes take place. Motor activity would relieve the individual. He points out that if activity is not carried out there will be more and more change in the autonomic and endocrine systems. He believes that the basis of all anxiety is the deprivation of parental love, but that more important than this in the "shaping of the psychic pattern are the patients' subsequent experience and development." He says, "Given the tendency to anxiety acquired in early childhood, and the general object of anxiety acquired as a rule in adolescence, the actual onset of pathological anxiety is precipitated by some incident which threatens the cherished attribute of the patient." In the case of the patient he describes it was the concussion which threatened the integrity of her mind. He feels that pathological anxiety will not be established unless the threat to security is continuous, repeated, or unless there is a serious, predetermined sense of insecurity, initiated as a rule in early childhood.

Freud, himself, in writing in the introduction to "Psychoanalysis and the War Neurosis" (*13*) pointed out that if the superficial investigation of war neurosis had not clearly shown that the sexual theory of neurosis was correct, that was quite another matter from showing it to be incorrect. He wrote: "The War Neuroses, insofar as they differ from the ordinary neuroses of peace-time through particular peculiarities, are to be regarded as traumatic neuroses, whose existence has been rendered possible through ego-conflict—conflict between the old ego of peace-time and the new war ego of the soldiers, and it becomes acute, as soon as

the peace ego is faced with the danger of being killed through the risky undertakings of the newly formed parasitical double."

In the same book Ferenczis wrote that according to the psychoanalyst the war neuroses belong to a group in which not only the genital sexuality is affected, as in ordinary hysteria, but also its precursor, the so-called narcism, self-love, just as in dementia praecox and paranoia. He said: "I grant that the sexual foundation of the so-called narcistic neurosis is less easily apparent, particularly to those who equate sexuality and genitality, and have neglected to use the word 'sexual' in the sense of the old platonic Eros. Psychoanalysis, however, returns to this extremely ancient standpoint when it treats all tender and sensual relations of the man to his own or to the opposite sex, emotional feelings towards friends, relatives and fellow creatures generally, even the affective behaviour toward one's own ego and body partly under the rubric 'erotism,' otherwise 'sexuality.'". He said that the depression, terror, anxiousness and high degree of irritability with a tendency to outbursts of anger, may be traced back to increased ego-sensitiveness. "This over-sensitiveness arises from the fact that in consequence of shock, which has been experienced once or repeatedly, the interest and sexual hunger (libido) of the patient is withdrawn from the object into the ego. There then comes a damming up of the libido within the ego, which is expressed in the abnormal hypochondriacal organic sensations and over-sensitiveness."—"A man who is already predisposed to narcism will of course fall a victim to traumatic neurosis; still no one is entirely immune from it, since the stage of narcism forms a significant fixation point in the development of sexual hunger (libido) of every human being." Karl Abraham, also in the same book, writes that war neurotics, even before the trauma, were labile people and many of them were unable to carry out their tasks in every day practical life.—"Their sexual and social capacity was dependent on their making certain concessions to this narcism—war placed these men under completely changed circumstances—they had always to be prepared for unconditional self-sacrifice in favor of the mass. This signifies the renunciation of all the narcistic privileges. The healthy person is able to accomplish such a complete suppression of his narcism—is capable of sacrificing his ego for the whole."—"It is not only demanded of these men in the field that they must tolerate dangerous situations, a purely passive performance, but there is a second demand which has been too much considered—the readiness to kill has been demanded of him, and a further factor, which operates on the labile sexuality of those disposed to neurosis, is the almost exclusive association with men. Sexuality of a normal person takes no harm from this, but it is otherwise with men of strong narcistic traits."

"Anxiety in regard to killing is of the same significance to that of dying. Hysterical convulsive attacks are not only produced through dangerous situations, terror, etc., but not infrequently an act of aggression which he has failed to carry out is expressed in them. Being buried—as the result of an explosion with its total obliteration of the conscious ego, naturally the most frequent originator of the war neurosis, acts most often as the first cause."

Ernest Jones said: "So far as I can judge, the specific problems characteristic of war neurosis are to be found in connection with two broad groups of mental processes—war adaptation—to killing, dirt, discipline, etc.—and to

fear." He thinks Freud's theory of neurosis holds and makes the following points:

1. They are volitional (to achieve an end in the outer world).
2. They are the product of some intrapsychic conflict.
3. The operative wish that leads to the creation of a neurosis is an unconscious one—not in harmony with the ego ideal.
4. Current repressed wishes cannot directly produce a neurosis but only do so by reviving and reinforcing the wishes that have been repressed in older unsolved conflicts. "In war neurosis the current difficulty is of greater importance than the hereditary disposition or the infantile fixation."

From the foregoing material it is evident that we must look within the individual for the most important factors in the etiology of war neurosis, but that heredity and environment may not be excluded. Heredity may not be excluded because the ability of the person to stand up under his conflicts, and work through them, may depend upon his constitutional stability; a bad environment, say, one which gives the individual insufficient rest, food, or continual emotional strain and tension, may temporarily also upset his usual stability and render him more susceptible to breaking down under conflicts which he might in time of less external strain be able to handle.

To turn now to the symptoms of war neurosis. As in any other branch of medicine, perhaps even more so than in many, the prognosis depends a good deal on the early recognition of symptoms and the immediate inauguration of correct treatment. In the last war it was felt that the length of illness, even the entire outcome, favorable or not, depended on adequate early treatment.

Types of neurotic symptoms which may present themselves at casualty clearing stations have been divided into two kinds by Wright (*54*). The first have symptoms of fear or panic which will go away when the danger is over. The second group have symptoms which will not leave when the danger is over or even with reassurance. Amnesia or stupor may be present. Sometimes there is a constant expression of terror, tremor, tachycardia, sweating. He says these cases should be quickly sent away to the hospital or they will infect others. Other symptoms may be present such as paresis, mutism, deafness, blindness, fugues, amnesias, stupors. These were quite common in the last war.

Hurst, writing of the last war said: "After the stress and strain of active service mild confusion or deep stupor may appear. The patient gradually becomes dull, after an incident which has caused terror or horror." He may become confused and wander off from his unit. On the other hand it may come on suddenly. He describes the case of a man slightly wounded in 1915 but fit until 1916, when he had to be forcibly stopped from going over the top to attack the Germans who were firing at his trench. He was "dazed and could not answer questions but could obey commands." The pupils were dilated; profuse sweating, pulse 140, convulsive tremor of head, trunk and limbs were present. Two months later in England, he apprehensively started at sounds whether asleep or awake, dreamed of ghosts of Germans he had bayoneted coming to take revenge. He was treated by hypnosis but failed to improve. When seen by Hurst eleven months later the limbs were paralyzed and exhibited hysterical contractures which relaxed under anesthesia or sleep; there was total anesthesia and analgasthesia of the whole body, including the conjunctivae and the cornea. Vigorous

suggestion and an intralaryngeal electrode gave him back a whisper. He had a total amnesia. He did not know where he was and did not recognize his family. His memory finally returned under treatment. He gives the case of another man who had fits and facial spasms, and dreamt of the grimaces of the German soldier whom he had bayoneted in the face. Another patient exhibited a double personality, after being buried alive for 15 hours, with complete loss of recollection of early life. He had to learn to read and write over again and did not recognize his parents except under hypnosis.

Wittkower writes: "In those not actually involved in the explosion the immediate results were the usual symptoms of anxiety, trembling, pallor, sometimes forced laughing, diarrhea, increased urinary excretion and marked thirst." "In several bombarded towns the civilian population suffered from anxiety states, lasting for weeks with disturbed sleep, acute hypersensibility, starting at the slightest sound, constant anticipation of noise, heart symptoms, polyria, glycosuria, vomiting, diarrhea and amenorrhoea." Again Wittkower writes: "Minor casualties such as terror states never reached the base hospital. Gross hysterical disorders often developed after transfer behind the line. Psychosomatic disorders such as effort syndrome, dyspepsia, and rheumatism were often misdiagnosed." He quotes Culpin as having said: "More neuroses lay in medical wards than in psychiatric hospitals" (*52*, *53*).

Wittkower and Spillane list the prodromal signs of anxiety state as follows: 1, fatigue; 2, increased indulgence in alcohol and tobacco; 3, tendency to become irritable and unsocial; 4, loss of interest and disinclination for effort; 5, emotional crisis, crying fits or states of anxiety and terror, also hypersensitiveness to acoustic stimuli, tachycardia, sweating. "If soldiers with such symptoms remained on the firing line a full-fledged psychoneurosis ensued." They write further that a stuporous state may occasionally usher in a neurosis. This, they differentiate from a traumatic loss of consciousness, as follows: "Traumatic loss of consciousness is followed by a period of confusion and delirium during which consciousness is regained for short intervals. On the other hand the prodromal 'functional stupor' state is one of acute terror-dilated pupils, a cold sweat, violent trembling, shallow breathing, inability to perform any voluntary movement. It is succeeded by a period of confusion and amnesia." The same writers give the prodromal signs of conversion hysteria as "fatigue, open complaining, resentment, often an express desire to be wounded." There is a lack of the sleeplessness and jumpiness, and a lack of the conflict between duty and other ideas such as was present in officers. Many writers, including Wittkower and Spillane, emphasize the fact that conversion hysteria was confined almost entirely to privates, while anxiety states, neurasthenia, etc., to officers. Hollingworth (*21*) saw four years' difference in mental level of the two groups.

A number of writers, among them Riggs (*38*) and Wittkower (*53*) emphasize the faulty recognition and lack of correct treatment for psychosomatic disorders in the last war. For example, "effort syndrome," or soldier's heart, which was first mentioned by Hawthorne and DeCosta at the time of the American Civil War, was still incorrectly diagnosed and treated in the World War. Many cases of functional heart disease were sent back and treated as organic disease. It is said that out of 1,043,653 British casualties there were 13,408 cases of functional heart, compared with 21,549 cases of

functional disease of the nervous system. This was found to be very common at U. S. Base Hospital 117 (*29*). Sir Thomas Lewis writes that: "During the last war cardiovascular sickness was one to every four wounds and was the second largest of all medical ailments. By 1918, 70,000 were reported sick and classed as cardiovascular and 44,000 became pensioners. Actually not more than one out of six of these suffered from disease of the heart. The rest were effort syndrome. These men came from sedentary occupations to the extent of 37 per cent." They were usually of nervous temperament and "Sensitive or garrulous, others apathetic or depressed (some sleep-walkers, some with enuresis, some with battle dreams). They showed increased heart rate, blood pressure and breathlessness, which can arise directly out of an anxiety state" (*25*). Guttman (*18*) and Mayer (*27*) writing on anxiety and the heart say that anxiety may be defined as "fear without object, and that the symptoms may be not only precordial oppression" but other sensations such as "dimming vision, shortness of breath, weakness of the knees, giddiness, tension in the head, pressure in the abdomen," and quotes Cannon mentioning the close association between anxiety, fear and anger.

"The whole of the anxiety reaction is integrated by the vegetative endocrine system and can be set going by any of its components, mental or physiological." The heart is associated with life: "Whenever the heart beat enters consciousness it confirms the awareness of life or signals danger and produces anxiety. It would be a mistake to assume that organic heart disease prevents the patient from developing neurotic symptoms related to the same organ."

Psychosomatic syndromes are described by Miller, Wilson and Wittkower (*31*) as psychological disorders which appear in the form of somatic disturbances. They emphasize the point that the disturbances of clinical significance are not the short-lived expressions of vivid feeling that may occur to any one of us, but rather the chronic emotional tensions which may be partially or entirely unrecognized by the individual concerned.

Under the cardiovascular system they list: Effort syndrome in which the individual reacts to effort by undue fatigue, breathlessness, palpitation, precordial pain, dizziness, blurred vision, vasomotor disturbances, *i.e.*, sweating, cyanosis, etc., and fainting attacks. Sometimes the effort syndrome may be superimposed on a mild organic heart disease.

Hypertension of an acute and transient character with elevation of systolic pressure to 180 mm. has been recorded in healthy soldiers after severe bombardment. Likewise prolonged hypertension in chronic anxiety states has existed long after discharge from military service.

Under the term 'Stress Dyspepsia' they describe various functional disturbances of the gastrointestinal tract: nausea, vomiting, cramps, diarrhea, pyloro-spasm or spastic colon. Peptic ulcer has been definitely associated with certain personality types in which the individuals are active, restless, unstable and frequently display an aggressiveness which is really an overcompensation for feelings of hostility, shut-in reactions, etc. Recently a remarkable series of observations on the influence of emotional states on the flow of Free Hcl. in the gastric juice of these patients has been made by Harold Wolff Miller, *et al.*, emphasize the fear of insecurity as a common factor in all these individuals, which exists long before the appearance of the ulcer symptoms.

Emotional diarrhea is also listed as one of the psychosomatic disorders. There is still some doubt whether its origin is purely emotional or whether it follows acute gastrointestinal disturbances of bacillary origin. They believe that it occurs in individuals who are markedly shut-in with feelings of inferiority which are compensated for by a flourishing phantasy life.

Genitourinary System: Nocturnal enuresis is the most frequent disturbance of this system and represents an individual who is biologically immature. It also develops in persons who fail to adapt themselves to army life. By some this is considered as a regression to a more infantile level.

At a meeting of the British Psychological Society (*27*) there was reference to psychosomatic changes: "In the average population, it is, however, not difficult to demonstrate a great variety of changes, mostly of a psychosomatic type, transient conversions affecting the gastrointestinal systems, mild anxiety reactions, a tendency to obsessional ritualism, and perhaps more generally a subdued depressive reaction. In the last war the community celebrated the outbreak hysterically, proceeded into a kind of slow obsession disturbed from time to time by cases of paranoidal reaction and gradually into depression, broke into a shortlived mania at the end of hostilities, and after a phase of active illusion formation, dropped back into a secondary depression." In spite of the fact that changes of this kind were noticed, it is said that a review of the literature (*53*) does not as a rule show an increase in organic disorders where there is a large emotional component such as ulcer, although diabetes and toxic goiter showed a slight increase, and an increase of gastric ulcer is now appearing in the Canadian soldier.

"Symptoms of gastrointestinal disturbances, and sexual difficulties, as well as cardiovascular disturbances are noted (*29*)—also skin lesions—an attack of psoriasis (*33*) on functional basis in soldiers after emotional shock." These had often been present in patients before the war. Many times "the symptoms of the neurotic while out of proportion to the more immediate upsetting event, were usually not out of harmony with it; for example the relationships between a slight hip trauma and a subsequent functionally paralyzed leg; between a somewhat insignificant concussion experience and headache, tremor, deafness, between unsettling emotional experience and the development of an anxiety state."

From the material that has been taken from the literature, then, it is evident that the symptoms of war neurosis may be extremely variable. They may involve a change in the function or functions of any organ of the body, in a group of organs, or in the harmonious functioning of the nervous system itself. Hence there is need to distinguish carefully between symptoms which are of organic origin, and symptoms which are of a functional nature. The latter belong to that class of illness which has come to be called psychosomatic and neurotic, where changes are reversible, and may be treated best with the aid of psychotherapy.

T. W. Salmon described the types of war neurosis seen in the following way (*42*): *disturbance* in psychic function: delirium, confusion, amnesia, hallucination, terrifying battle dreams, anxiety states; *disturbance* of involuntary function, heart, blood pressure, vomiting, diarrhea, enuresis, retention or polyuria, dyspnea, sweating; *disturbance* of voluntary muscles, polyuria, tics, tremors, gait disturbance, contracture, convulsions; *disturbances* of special senses—pain, anesthesia, mutism, deafness, hyperacusis, blindness, and disorders of speech.

The classification used by the medical department of the United States Army (*31*) is more like that which is seen in textbooks and statistical guides: 1. Neurasthenia. 2. Psychasthenia. 3. Hypochondriasis. 4. Hysteria. 5. Anxiety neurosis. 6. Anticipation neurosis and effort syndrome. 7. Exhaustion. 8. Timorous state or state of anxiety. 9. Gas neurosis.

The authors wrote: "By far the most striking of all war neuroses, clinically at any rate, is hysteria, as anxiety neurosis is the most subtle and intangible." "Both represent unconsciously produced neurosis, and both are types of a dissociation process. The one shows itself by dissociation of motor, sensory, special sense functions, and in some instances of the function of memory; the other by purely psychical forms." Hysteria showed no evidence of conflict, anxiety neurosis arose out of conflict with strong moral or ethical component. Hysteria was most easily cured, anxiety most difficult. In hysteria, there was little relation to pre-war conditions. In anxiety neurosis, analysis often led back to pre-war conflicts in which the same or similar elements were demonstrated. "Hysteria, then, is to be considered a type of war conflict by which functional activity in either its motor, sensory or physical capacity is blocked from consciousness and conscious control—the part or parts in either instance divorced from consciousness can maintain itself in one of three ways. It can cease to act at all; it can act abnormally; that is, in a qualitative sense; or can hyperact, that is in a quantitative sense. (Paralysis, uncoordinated, or perverse forms of movement, or convulsive-like movements.) This same thing is found naturally in the sensory and special sense fields. This dissociation process is most frequently set in activity by sudden emotional or physical shock. The type of reaction in hysteria in respect to both localization and function bears a definite relation to the local effect of the trauma."—"Among the most interesting phases of hysteria in its war neurosis coloring are the amnesias, which may be regarded as pure types of dissociation in the purely psychical sphere, and they obey apparently the same sequential rule as the cruder forms of response. The single and most reliable evidence of hysteria is the dissociation process."

In writing of anxiety neurosis, the same book says, "It is in an anxiety neurosis that the most complete example of psychical dissociation is met with, that is, a dissociation unaccompanied by anatomically expressed loss of function. Anxiety neurosis has to do with a more general process and reaches down more deeply into personality than the more superficial mechanism seen in hysteria. Here there is conflict, and repression not only of the memory of the experiences themselves, but also of the emotional reaction associated with them."

The proportions of one type with another vary. As we mentioned before, anxiety neurosis is more common in officers and hysteria in the regular men. Dillen (*11*) wrote that of 4,235 cases apart from officers that were treated at a shell shock center over a period of 22 months, the cases were as follows:

1. Direct anxiety or fears—jumpiness, shaking, nervousness, headache.
2. Type in which mental confusion or stuporous phenomena formed the central figure.
3. Cases in which conversion symptoms, such as mutism, paralysis were most important.
4. Conditions in which amnesia of fugue state constituted the main phenomena.
5. Combined types of cases in which a war neurosis developed in conjunction

with organic disorders or with previous neurosis.

The following is an example of a case of amnesia: "A man after more or less fatigue, induced by marching and exposure in the trenches, is incapacitated by the explosion of a shell in his immediate vicinity. He may be merely knocked down or thrown in the air, and more or less severely injured or wounded by concussion, shrapnel bullets, or shell splinters. Consciousness is lost for a variable time, but often not so far as to prevent automatic movements, so that the man may be able to walk in a dazed condition to the dressing station. The mental equilibrium at this stage is much disturbed, and all memory of this phase is usually lost. The most striking feature of the case is that the man is instantaneously struck blind. The blindness may be associated with deafness, loss of smell and taste, but these are all less frequent than blindness. On examination it is found that there are intense blepharospasm and lacrymation.

"The lids are opened with great difficulty and examination of the eyes is almost impossible." The author is not aware of any record of the condition of the pupils at this stage. "In the course of a week or two the blepharospasm diminishes and it becomes possible to examine the fundi. Of course there may be local injury to the eyes but in uncomplicated cases the eyes are normal. The pupils react to light, although in some cases the reactions are sluggish, and sometimes one pupil differs from the other, being larger or more sluggish than the other. The fundi appear absolutely normal. By this time probably some restoration of light has occurred. . . . The recovery of vision is slow but eventually it will always be complete."

"There are several suspicious symptoms in such a case. The eye to recover last is often the shooting eye. Some patients show an obvious disinclination to duty. Some candidly admit being in a 'blue funk.' In all this there has been a complete mental upset, sometimes accompanied by hysterical symptoms—outbursts of weeping, etc., in the early stages. These features render it only too easy to jump to the conclusion that there is often a large element of shamming in the case." It is because there is grave danger of cruel injustice being done the men who have faced the music that Parsons attempted to explain the underlying psychology. Since there is no demonstrable organic lesion, these cases may be regarded as injuries or wounds of consciousness. This does not imply that there is no neural lesion to account for the psychological disorders, but merely that it has hitherto escaped observation. Parsons adopts the view of parallelism between physiologic and neural processes and psychologic events or changes in consciousness (*35*).

"In the case of a soldier under shell fire, the man is usually bodily fatigued whereby his sense of control is impaired. He has the fear of death before his eyes and is in a state of acute excitement, whereby his normal judgment is impaired. These conditions conspire to give his innate instincts ungoverned play. On the other hand, positive self-feeling, aided by suggestion and imitation and the sentiments of patriotism, the honor of the regiment, his honor, etc., enforce his volitional control. At last, however, the shock comes which strikes him unconscious.—He is rendered 'subconscious' and hence a victim of his lower instincts.

"The unconsciousness in these cases can be explained physiologically by an abrogation of the functions of the highest cortical cells. Recovery shows that they are not irretrievably damaged, and it is most likely that the block occurs on the afferent paths at the synapses of these cortical cells."

No discussion of the war neuroses would be adequate which did not include the subject of malingering. It has been said that during the last war, many mentally sick individuals were court-martialed and sentenced; Chavigrey wrote (*7*) "that the need for the psychiatrist in conjunction with court martials was very great." He said that the most usual forms of mental delinquency, desertion, abandonment of the post of duty, refusal to obey, destruction of arms and personal belongings, flight, incendiarism, rebellion, violent actions, assault, etc., are usually traceable to some form of mental trouble. He mentioned several cases where the psychiatrist saved the individual from court martial. He found that cases of true malingering were comparatively rare. Glueck goes even further (*16*) and says that malingering and mental disease are not mutually exclusive, and that they may often be found in the same individual. He feels that "malingering itself is a form of mental reaction, manifest almost exclusively by those of inferior make-up and that cases of pure malingering in a normal individual are rare." He believes that malingering is a special form of lying which is resorted to chiefly, if not exclusively, by the mentally abnormal, such as psychopaths, hysterics, and the frankly insane. Along the same line of thought is a remark by Shaw in the United States Naval Medical Bulletin (*43*) stating, "There is getting to be a more generally held opinion that it (malingering) never occurs in a normal person. It is not always true that malingering is an acutely conscious reaction as it is often beyond the awareness of the individual, occurring in the subconscious."

There were, however, two forms of disability during the last war in which the intention of avoiding duty in areas of great danger was obvious enough to cast grave suspicion upon the integrity of the individual. We refer to the fairly large numbers of self-inflicted wounds, and the stragglers who got lost at night while on the way up to the front lines. The former occurred with similar frequency in the French, British and American armies, and were particularly difficult to deal with because the stage could always be set to make it appear accidental. The fingers and the toes were the locations of choice. A typical example was that of a soldier seen by one of us just after the Marne Campaign, while the division was in rest and receiving replacements. He had done extremely well during the various phases of the battle, and had won a commendation from his superior officers. He reported sick to the division psychiatrist, exhibiting moderate anxiety, some moisture of the hands, no tachycardia, and on the whole no clear-cut picture of a neurosis. After several interviews he broke down and admitted he had just about enough and felt that he had already done his bit and should be relieved from further danger. After persistent efforts of persuasion and coaxing he finally returned to duty and set to work drilling replacements. It appeared as though his recovery was complete and everything went well until the division was ordered back to the line at St. Mihiel. That night he appeared at the dressing station with a self-inflicted wound of the left hand. Unfortunately he was evacuated before he could be examined by the psychiatrist.

The stragglers who lost themselves also were a serious problem in the first part of the war, and really before the AEF reached the European continent. The French realized that this constituted a serious loss of effectives and was exerting a demoralizing influence on combat troops in the front lines, and were forced to deal with the situation in a severe, energetic way. The practice

did not materially decrease until they resorted to mass executions; on one occasion this happened to an entire company.

The large number of disabilities from neuroses in the early stages of the last war which gave rise to so many problems of evacuation transportation, loss of effectiveness, etc., naturally directed attention towards methods of prevention of these conditions. In every army those who appreciated the situation (Osler, Wittkower and Spillane, *et al.*, *53*) recognized the importance of eliminating the psychiatrically unfit before subjecting them to the stress and strain of military life. The importance of such a step can hardly be over-estimated when one considers that such measures effectively employed would relieve the armed forces of a great amount of ineffective material. The burden of the army medical units in the field would be greatly decreased, and the care and the cost of these war-born disabilities in peace time should be immeasurably lightened. The prompt recognition of these individuals is not easy since it is not always possible to select those who will be able to endure the stress and those who will go to pieces. In the quick surveys that are made by the examining boards and in the short period that the psychiatrist is permitted with each man before he is accepted or rejected, it is not possible to get at many of the conflicts in an individual, the hereditary history may be incomplete and the amount of stress that the person will have to stand up under is not known. Yet, the care of the large number of men sent home from the last war as unfit because of nervous illness, and veterans developing neuroses after their return, costing almost a billion dollars (Harry Stack Sullivan lecture at N. Y. Society for Clinical Psychiatry, Jan. 9, 1941, N. Y. Adademy of Med.) would surely indicate the need for more efficient selection.

In the same lecture Sullivan suggested the following classification for practical purposes: 1. Mental Deficiency. 2. Disorders of Moods. 3. Psychopathic Personality. 4. Psychosomatic. 5. Neurotic. 6. Prepsychotic and Psychotic.

Of the list of disorders suggested, only the one known as psychopathic personality seems to present great difficulties of recognition.

This group comprises a large number of unstable, unreliable individuals who for the most part become a distinct liability to the government a relatively short time after their induction into the military forces. The number of psychopathic persons who since the last war have profited by the benevolent, oft misguided attitude of this government, through the facilities of the veteran's bureau, has reached imposing proportions, and thus increased the burden of the taxpayers.

The recognition of these types for the purposes of elimination at the time of induction is confronted by many difficulties which are at times almost unsuperable. The reason for this is not hard to understand when one attempts to obtain a clear, concise idea of the meaning of the term "psychopathic personality," or, as it is sometimes called, "constitutional psychopathic inferiority."

A glance at the literature will suffice to show how varied are the conceptions of the different authors, and one might almost say that they vary according to the philosophical conceptions of those who are attempting to present a clear-cut, concise picture of the condition. The reason is probably not far to seek, since one is dealing with a large group of personality or character variations which occupy a domain that is still hazy in conception, and not properly charted. It lies between what is considered the normal, well integrated, properly ad-

justed individual who moves and acts in the environment in which he finds himself, in the manner of a normal, independent social unit, meeting his obligations and assuming responsibilities in what we are accustomed to call a normal manner; and at the other end of the scale the frankly psychotic types of constitutional origin or the various organic conditions which are characterized by real disabling psychotic manifestations.

Bleuler warns against the attempt to separate them into very strictly delineated types, because of the infinite number of variations and differences that follow the personality make-up, rather than a classification. He considers them as individuals who have suffered one or more psychic deviations from the normal that are not limited in any other way. They may exhibit the same characteristics as the psychoses in merely a slighter degree; paranoid, schizoid, cyclothymic, latent epileptics, etc. Bleuler also follows Kraepelin's views as to the limitations of the endless variety of types without adopting strictly his classification, but he believes that while the theory of inhibitions of development may answer satisfactorily some of these problems, it is not all-embracing, and cannot be used to explain the great group of these deviations. Bleuler is content to assume that most of these types are merely deviations from the normal, just as may be seen in most domesticated animals. While the text is not too clear, it would appear as though he is content to regard infantilism as a deviation, and believes that the concept of developmental inhibitions is still too vague to satisfy all the facts.

Ebaugh and Strecker on the other hand consider these individuals in the class of developmental defects in which the defect is for the most part outside of the intellectual sphere, an observation which serves to differentiate them from the mentally defective.

It become obvious that there is considerable doubt about the true pathological process operating in these types, but if developmental defect leaves a lot to be explained, the term deviation tells us still less, whether it be man or other domesticated animals. It will be necessary to wait until human thought processes, personality qualities, judgment, moods, impulses, sense of responsibility to one's obligations, etc., are more closely related in a biological sense to those particular cerebral functions and structures from which these attributes emanate.

Several of the types have been mentioned above in connection with their suggestive resemblance to some of the well known psychotic types, *i.e.* paranoid, schizoid, cyclothymic and latent epileptic types. These may also, under sufficient stress and strain, show definite psychotic reactions which disappear under adequate treatment and leave the individual in the same unstable state as before. A particular example may not be amiss at this time. It concerns a man who had a somewhat unhappy life after entering a boarding school because of his size and certain characteristics known as egocentricity, rigidity and emotional paucity. He carried these traits into adult life, but he learned to over-compensate by a certain boisterous humor and cynical wit, so that he was more or less popular with a small circle of friends. During the first few years of married life he was unstable, hysterical, given to tantrums but carried on, and during the war enlisted with great enthusiasm, but at the same time displaying little interest in what measures were taken to provide for his own family. In France he carried on well while at the front, but on leave in Paris became the victim of conflicts between his sex desires and the rigid family ethical standards he had adopted.

He tried to compensate by onanism, but remained upset and unstable until he returned to the front line. After the armistice the inclination to compensate by a rigid, martinet-like attitude almost got him into trouble with some of his enlisted men. On his return home he found himself no longer the family hero and after endless quarrels and hysterical tantrums, he became so upset and disturbed, frequently exhibiting noisy behavior, and threats of violence, and so failed to improve under hospitalization, that at one time commitment was considered. As soon as his family difficulties were settled he began to improve and is now leading a useful, happy, productive life. The personality traits remain the same, however, and resemble those of the epileptic, even though he has never had a fit.

Emotional instability and mild disorders of mood are frequently seen in these individuals when they find themselves unable to adjust to situations that become unbearable. This may take the form of exhibitionism, thieving, sexual excesses or abnormalities, sullen, refractory moods in which violence or various types of delinquencies may occur. Depressions, exhaustive states and even an atypical form of effort syndrome may be seen.

There is little doubt that various deviates, such as pathological liars, vagrants, some types of prostitutes, sexual perverts or inverts, drug and alcohol addicts, are more likely to be found in this group than any other. As Strecker and Ebaugh point out, there still remains a vast amount of research in this field before a clear conception and a better understanding of the problems contained therein are obtained.

There is also another personality deviation that in all probability fits into this group. We refer to a certain type which is more closely related to the inadequates or vagrants than any other. They appear to bring with them into adult life a complete lack of a sense of responsibility to whatever obligations they may have assumed; they lack aggressiveness although new ventures are often undertaken with enthusiasm and a display of energy at the start. Their feeling tone is low, and they have little or no capacity for the persistent continuity of application necessary for the successful achievement of whatever has been undertaken. They are easily diverted and deflected from whatever course they may have undertaken. The life history of a man now about 58 will serve to illustrate this type. In youth he was a whiney, unpopular boy, telling tales to teacher or mother. His father was alcoholic and his mother, always non-social, developed a psychosis of the involutional type, in which she died. His preparatory school life, under strict supervision, was moderately satisfactory. He was unable to assume the additional responsibilities of college life, however, and was so heavily conditioned at the end of his first year that he became easily discouraged at the beginning of his sophomore year and started to rationalize himself out of college by the display of great eagerness to begin earning money in a business life. His business career was a record of similar failures. He had a somewhat pleasing address and manner, and for a while had no difficulty in landing new jobs. But the same pattern appeared in each instance with startling clearness. The average time was four to six months, and each new job was undertaken with an enthusiasm and energy that lasted six or eight weeks. Then the enthusiasm began to wane, he became critical of his superiors, grew lazy and indifferent, and was usually dismissed after he had spent considerable time criticizing his superiors, day-dreaming and projecting himself into the office of president of the company. He then lapsed into a state of

indifference, apathy and excessive use of alcohol. He was taken in hand, sent west for training on various ranches, where he soon became notorious for his laziness and indifference. About this time this country became involved in the late World War and he applied for and received an appointment as a Forest Ranger. It was felt that he had the education, training and all necessary qualifications for the position. Here again the same faults obtained and he was soon dismissed for incompetence. About this time a young woman became interested in him. They were married, and for five years, during which time they had two children, he did very well and advanced rapidly to a position where he was earning $5,000.00 a year. Then he again began to show lack of interest in his job and a tendency to escape through alcohol. He naturally lost his position and drifted downward until he became a bowery vagrant. He was induced to enter the psychopathic ward at Bellevue and was finally accepted at one of the State Hospitals where he remained for twelve months. He established a record of good conduct, cooperation and willingness to work and was discharged on parole. After a short while he began to regress and accepted the advice to return to the hospital, where he remained eight months longer. During this time he attracted the attention of a social service officer who took a keen, intelligent interest in him and got him a position as a night supervisor in one of the city hospitals. During his stay in the state hospital he was a model of industry and sobriety, earned many privileges which were never abused, and had a record for being one of their very efficient operating room orderlies. At the end of two weeks he disappeared and since then has followed a roving life aboard ship, usually in the engine room. When hard up he usually applies to his wife for money, and if unsuccessful he goes to sea again.

Time does not permit more than the mention of the criminal types: the deliberate, the recidivists, the professional criminals who certainly belong in this category. They are anti-social, are often subject to definite compulsion patterns, and are recognized by long criminal records.

Probably the epileptoids, especially those suffering from sudden, unmotivated acts of violence often homicidal in nature, likewise belong in this category.

A great many of these individuals are extremely difficult to detect during a short examination, even by the most expert psychiatrist, and many often escape detection after a more extended interview. Indeed, a great many of the type described above may do very well in a branch of the service where they are only required to assume responsibility commensurate with their capacity, and where they are under the shelter and protection of a paternalistic government that answers whatever need there may be for a sense of security, even though it be temporary. Aside from this group, however, there is no place for these individuals in an environment so radically different from that to which they have been accustomed, and there is bound to be a certain amount of trauma produced by the close contacts, the strict regimentation, the regulation of work and even recreation time; although an apparent adjustment seems to be taking place, and they appear to be finding a proper place among their comrades, there is considerable emotional wear and tear that renders them fatigable and ready for the development of non-social tendencies which render them liable to disciplinary measures. They become delinquents, or disturbing influences among their comrades, and exhibit to an obstructive degree the accentuation of

whatever deviations may have been inherent.

During the mobilization preparations for the last war, intensive measures were undertaken for the purpose of preventing the nervously unfit from induction into the military forces of the United States. This was accomplished by detailing individual psychiatrists to the various officer training camps, with instructions to examine the entire student body, and by creating boards of psychiatrists in the divisional training areas, who eventually exercised the same function for the entire division.

The statistical evidence furnished by the report of the Surgeon General would appear to confirm the wisdom of this procedure. Thus we find that of the 69,394 persons discharged for various types of nervous disorders, 10,674 or about 15 per cent were diagnosed addicts and constitutional psychopathic states (Vol. X, p. 85). In the AEF however, their incidence was much lower. Five thousand four hundred and eighty-nine cases of nervous disorders passed through Savenay. Of these 634 or 8.65 per cent were evacuated as psychopathic states, including addiction to drugs and alcohol.

These figures are probably fairly representative, since by far the greatest number of these cases were evacuated through Base Section No. 1. There were however other evacuation sections, but unfortunately Vol. X of the Surgeon General's report gives no statistical data on them. Thus the divisions of the AEF assigned to the British forces used their facilities and the neuro-psychiatric cases were sent to England and returned home from those evacuation ports. Also Bordeaux formed an active evacuation section next in importance to Savenay.

Next important in the prevention of neurosis is the provision of proper rest periods, recreation, etc. for all individuals who are under stress. Men who have had sickness or have been under great strain need this particularly. Whenever possible, periods of undue tension should be shortened. The same applies to periods of undue idleness where there is no chance for rest and recreation. Adequate understanding of the situation and an explanation not only to the medical officer but to the men themselves of the origin and nature of psychosomatic symptoms is essential. If a diarrhea is the result of nervous strain, it is better for the men to know it and understand than to think it is due to polluted food or some physical cause. Likewise if he understands that palpitation is a normal result of excitement and fear, he is less likely to develop panic and think that he is going to drop dead from heart trouble. Not only is the appreciation of the nature of these symptoms important as a means of relieving the man from the fear that he may have some serious organic ailment, but also because freedom of talk and conscious recognition of that fear will in itself help to relieve the patient of a good deal of his tension. Understanding and verbalization of fears, conflicts, etc., is the best known preventative for the development of symptoms due to fear. Sherrington (quoted by Dunbar) points out that next to action, talk is the best release of tension. In no case should an individual be given the idea that because he is afraid he is a coward, or that these fears should be forgotten, for it is forgotten fear and other forgotten conflicts which produce neurosis. It would seem that just as in wartime the soldier is trained to be ready for surprise attack from the enemy, so should he be trained to be ready for situations of this sort that arise and know a little of how to cope with them. Naturally with the present general lack of realization by the medical profession at large as to the nature of psychosomatic illness and

neurosis in general, it is also equally important that all medical men who are in any way to deal with illness arising in the forces be given a knowledge of the material that was found in the last war, and further developments along these lines since then. It may be even more true than we realize that this is a 'war of nerves.' Likewise it has been called a 'total war' and is a war where civilian population is exposed to dangers and hence to the development of war neurosis so that a little understanding of this is also urgently needed by the general doctor who is not with the forces.

Quite as in any other branch of medicine, it is felt that early and adequate treatment in war neurosis is in the long run the best and most efficient, also the cheapest both as to individual suffering and wants, also as to cost to the country in wasted man power and money needed to care for the bad results. This of course also applies to psychosomatic symptoms, such as effort syndrome.

French and German writers at the time of the last war stress the importance of early adequate treatment. Weggandt (*51*) said that the aim should be to hurry the patient away at once, stupify him with a narcotic if necessary, or use force, as a kind of mass psychosis is liable to develop in time of panic. The French writers (*39*) said that the earliest possible classification of cases is necessary both from the point of view of treatment and proper administration of the service. Time is saved, but more important, the patient does not have time to "brood over his symptoms, thus exaggerating and fixing them." The following treatments were used: psychotherapy, electricity, cold showers. They said that if the cure was rapid it took a day, if slow, three days, and that the men could return to the front in two to three weeks. This is an unusually optimistic view of the situation, unless the person is of very stable type. Other writers point out (*15*) that in men with nervous diathesis the acute symptoms (paralysis, spasm, mutism, deafness, delirium, and twilight states) did not disappear so readily. Or sometimes they left and the patient appeared all right until ready to go back to the front again, when they again had symptoms. Many feel that men of this type are more useful away from the front, and may serve best by keeping at their civiliam occupations. Morselli presented a paper at the meeting of the Royal Medical Academy of Genoa (Bull. Ontario Hospitals for the Insane, pp. 6–7, July 1916) where he stated that he believed all forms of war psychosis were curable in a short time if treated early. He felt that it was important that the diagnosis should be made at once within the war zone—and that the patients were better not sent to an asylum as there was more or less conscious simulation of symptoms of others. He stressed the need for psychiatrists, saying that without special knowledge, mistakes are usually made. Mohr wrote (*32*) that individuals suffering from nervous and depressive conditions in the last war were usually predisposed in two ways—somatically or psychically. He said that the somatic weakness shows itself in excessive fatigue, exhaustion, sleeplessness, tremors, and other motor disturbances, vascular and cardiac affections, paraesthesias, marked dermographia, pain in the region of surgically cured wounds, etc. The psychic predisposition is shown by apparent change of personality, psychomotor disturbances, states of anxiety, and depression, excessive irritability, fits of laughing and crying, fixed ideas, phobias and tendency to start with fright at loud noise. He said that the psychic and organic conditions frequently coexist and influence each other so that the diagnosis of neurasthenia

and hysteria are not clearly defined, and that they cannot be cured by will power. Today, with the advance in psychosomatic medicine, we should not call the somatic disturbances organic, but the rest of this material holds, as does the writer's statement that treatment should not be physical alone, although such treatment as rest, sedatives, tonics and exercise may be helpful. He said that in all cases except those of exhaustion or brain injury, psychiatric treatment is most efficient. The patient should not be sent home but to a convalescent pavillion in charge of a psychiatrist who has not more than thirty patients. He stresses the fact that these patients should never be sent to sanitaria for treatment of patients with cardiac, rheumatic or intestinal symptoms because experience has demonstrated that under such treatment, psychogenic symptoms become fixed and the patient is more likely to have them in the future.

It may be emphasized here that in our survey of the literature, there is only one writer who has anything favorable to say about delay in the treatment of patients. All others stress the importance of early adequate treatment by men who are psychiatrically trained. This writer (*26*) was MacMahon who, in the treatment of cases of voice and speech affections, felt he could do better with patients who had been in convalescent homes several months. On the other hand Ormond who wrote of concussion blindness (*34*), said "Any lack of recognition of the condition in the early stages prejudices the prognosis." Earlier cases were treated with rest, tonics, deprivation, or punishment, but these means were comparatively ineffectual until suggestion and hypnosis were tried. Some noticed (*6*, *9*, *37*) that patients with functional loss of voice began to talk when drunk and that light anesthesia was efficacious in the treatment of functional loss of voice and functional deafness. The loss of consciousness should be very slight so that the patient may hear himself as he is coming out, and know that he can talk and hear. It is also brought out (*4*) that after a loud explosion a person is temporarily deaf and may assume that he is really deaf and get in the habit of not listening.

Wittkower and Spillane contrast the treatment by isolation with lack of food and application of painful stimuli to a sympathetic attitude combined with psychotherapy and occupational therapy. They believe with others (*36*, *48*, *53*) that hypnosis gave good results in some cases and found that men were peculiarly responsive to hypnosis. Podiapolsky (*36*) said that only 2 per cent were refractory. He used hypnosis to decrease pain and to lessen the amount of anesthetic needed for operation.

At first there was a belief that one should help the patient to forget his experiences by distraction, rest, etc., but as time went on, it appeared that the most important factor in treatment consisted in helping the patient to relive and recall the emotionally charged experiences which were upsetting to him (*13*). Although this is a technique which is most often used by the psychoanalysts, they themselves do not use a full orthodox technique. Jones, for example, wrote that he saw no reason why psychoanalysis should be attempted in the majority of cases. Wittkower said that usually three sittings were enough, but that sometimes a reaction obtained through speech was not enough and then an upholstered dummy used to assist in acting out the repressed emotion. In the AEF base hospitals a simple explanation of the hysterical mechanism was given, and "the point was made that it was unconscious." The patient was encouraged to talk freely about his ex-

periences, and to go over the emotional states that accompanied them." . . . "In hysterics a simple explanation, reassurance, explanation that the leg is not really paralyzed, but that the patient has forgotten how to use it, then tricks to make them use it—to jump at sound, etc."

Ballard (*2*) writes: "Ten minutes' conversation daily with anxiety types, together with assurance that they will not be sent on active service again for many months, if ever, does more good than all the devices of the engineer and the plumber." (Referring to electro and hydro therapy.) He also pointed out that patients showing signs of fear, as well as somatic symptoms, should not be cured of the latter until the fear disappears. Rows (*40*) made an interesting observation, when he said that a patient might make a partial recovery from shock and appear all right, but inwardly, have a change of feeling tone or personality which makes him far from well and under no condition should he go back in this state. Exactly opposite to all the foregoing are the methods used by some German and Austrian workers, which seem to be a fairly good example of the strict and harsh treatments used by some men in all armies and later, discarded. These cases were treated with preliminary suggestion, and then given very powerful electric shocks, the pain of which was said to be greater than that of woman in labor. There was strict military discipline. Sometimes hours were needed. It was pointed out that this treatment could be carried out by someone without adequate experience. After the ordeal the patient was kept in the hospital for a few weeks to prevent relapses. It was called an inhuman treatment. The results were poor, 40 per cent were unfit for further service and 20 per cent had to be discharged to other hospitals or asylums (*5*).

To consider some recent discussion on treatment: Sargant and Slater (*45*) writing after Dunkirk, say that the immediate treatment should be rest, full diet and plenty of fluids. Some patients who had dreams need hypnotics and some acutely sick patients need continued hypnotics. The reason they give for this is that it will see them through the worst period without their knowing how bad the symptoms are. The reviewer (ALB) thinks that sedative medication should be rather to give the body a chance to be built up with food, fluids, and rest, and that perhaps wet packs or prolonged baths would be even more beneficial, and, wherever possible, the patient should be given a chance to talk over his fears, etc., early, and so get relief. The writers stress the danger of the patient's symptoms becoming habits, and say that the longer they are allowed to persist the harder it is to get rid of them and the more likely they are to return in future patterns. This is something to remember in the need to get the patient under treatment as soon as possible. Slater and Sargant found that within a few days of adequate treatment, the degree of improvement was great and patients could be up and around and treated with occupational therapy in a few days. In discussing psychotherapy, in these cases, they say there is antrograde and retrograde amnesia. They agree with all the other experienced men that this must be abolished and say that at times it may even be done by a period of narcosis. Sometimes this can be done by hypnosis, but the quickest and best method they have found is by injecting 7½ grs. of sodium amytal slowly into the veins. They bring out that the emotional situation in the patient's own life as well as the war situation are often factors in the acute break. They give an example of a man dreaming that his brother was so severely wounded that he had to

shoot him, or a man dreaming that he had his little son with him during battle and lost him. There was extreme emotion and much guilt in these patients. They feel it is a good thing to try to decrease the emotion that comes with this uncovering of material and try to get the whole thing out at one sitting. It seems questionable whether it is well to repress the emotion, and in an ideal set up, perhaps there could be more sittings and the thing done more slowly so that all the emotion may finally be expressed. One wonders whether the unexpressed emotion may not later cause somatic symptoms or further neurotic break. These writers also feel that nothing should be said about the patient returning to duty soon or until he is well over his break. Otherwise, he may break under similar situations.

Southard (*47*) wrote of the last war, "The diagnostic problem in shell shock is a problem in neuropsychiatry at large; however wide the diagnostic field, the therapeutic field is wider." This is a good thing to keep in mind when reading the different methods of treatment and combinations of methods and adapting according to the needs of patients, and materials at hand. He considered treatment under the following heads:

1. "Persuasive talk," isolation and rest in bed, milk
2. Faradization
3. Re-education
4. After care

Dillen (*11*) listed the same with the addition of exhortation, hypnosis, and a need to make the patient aware of the fear mechanism and its control. Wittkower and Spillane (*53*) in going over methods of treatment also list many of these, but stress the fact that from experience gained in the last war, it was believed that abreaction was necessary. This could be accomplished in some by hypnosis, in others by analytical discussion. Ferenczis and others also stressed the importance of getting the patient to live through the critical scenes and letting him "re-experience the terrible emotion" (*13*). Simmel indicating how dream analysis helped, said that usually the patient could be relieved in three sittings. He wrote that drugs should never be given for dreams of anxiety, terror and rage, and looked on these dreams as "an attempt at self-healing." Hurst (*22*) says that when a bad dream persists for some time, nothing but psychotherapy will relieve it, and brought out the need to keep the men thinking of their unpleasant experiences during the day, rather than to repress them. He also stressed the need for the patient to discuss his symptoms with someone in whom he had confidence, without fear of misunderstanding.

The Medical Department of the United States Army (*29*) made the following outline of principles of treatment after the last war:

1. The first principle was to cure the soldier and send him forward.
2. As short a stay in the hospital as possible for adequate treatment—the average three weeks.
3. All attempts at treatment in hospital cases should be made as soon as possible, *i.e.*, within 48 hours.
4. War neurosis was caused by mechanism not under the patient's control in its initial phases, but if the symptoms persisted over four weeks, there was thought to be the desire of the patient to remain protected by his neurosis.
5. Work was used whenever possible.

In cases of hysteria, the mechanism was explained to the patient, and he was given the understanding that it was unconscious. He was told that it would go away rapidly, and asked to cooperate as much as possible. "Then sugges-

tive, symptomatic treatment, designed to remove as rapidly as possible the symptoms, in order of importance to the patient. After the treatment they emphasized that they attempted to increase automatic inhibition so that the symptoms would not reappear. In some cases Faradic current was used, in others persuasion, argument, and so on." In the treatment of anxiety neuroses, a certain amount of time was devoted to the past experiences of the patient, and the attempt was made "to train him to face daily, as a matter of course, the experiences that he has been through, no matter how uncomfortable and terrifying they may have been. It was in a sense a modified, psychoanalytic procedure adapted to war-born conditions, devoid of a good deal of technical complications of the method used in peacetime." The men were encouraged to talk about their experiences and to go over the emotional states which accompanied them. Their conflicts were analyzed out. "None found it necessary to employ more complicated technique than the question and answer—this was not difficult to do as the conflict is formed out of simpler elements, more recent, less deeply buried, less embarrassing than in peace neurosis." . . . "Comparatively few men ever acquire the knowledge, patience, tact, insight, and firmness to treat such cases adequately. Anyone with a little experience could treat the hysterics successfully, only a few qualify as good therapists in anxiety cases." They suggest that drugs should be used as little as possible. The trend of therapy in the last war was to treat the patient as soon as possible, to rest and build up the patient, to use drugs sparingly, to reeducate and explain the mechanism of the illness to him, but above all, to give him the chance to live over and express again the emotion involved in his painful experience. It was felt that the services of an experienced psychiatrist were needed.

The present war has produced some more material along the same line. In writing of the Spanish war Mira (*30*) says that he thinks the low incidence of neurosis among Spanish soldiers was due to the fact that the soldiers were referred to psychiatrists if they showed any neurotic symptoms at all. He describes a very malignant type of anxiety state—tachycardia, increased reflexes, concentrated urine, etc. The patients usually died. We feel that it is quite possible that if these patients had been treated by forced fluids, wet packs, instead of drugs, they might not have died. In chronic cases, Mira used insulin, instead of psychotherapy.

Snowden (*46*) writes that the man with a phobia connected with his work as a soldier is particularly vulnerable, some may be unconcerned with the risk of death, but will break down with the sight of blood. He thinks if cases are reached early enough, before complications develop, they do not need intensive psychiatric treatment. He says that they should be given the feeling that they are being treated for emotional strain. He reported that hyoscine hydrobromide could be given to a man while on duty. This seems to the reviewer to be an extremely risky thing.

Recently William Brown wrote that from experience in the last war it is important to distinguish in treatment between the early cases near the front line and the more chronic cases at the base hospitals. "Early cases respond well to firm though kind treatment by short methods of persuasion and explanation, and by recovery of lost memories in a state of muscular and mental relaxation." He said that about 70 per cent were returned to the firing line after two weeks in casualty clearing station and that out of 2,000 to 3,000 cases on the Somme between the autumn of 1916

and spring of 1918, only three per cent were malingerers, and 11 per cent psychotic. The men whom he was able to treat and send back to the fighting line, "included soldiers of proved courage and the majority stood up to fighting conditions afterwards." "On the other hand, chronic cases, such as I saw afterwards, needed more prolonged care and detailed psychotherapeutic treatments by methods of deep mental analysis." These he said were mostly unfit to go back and it would have been better for the state and themselves if they had not been taken on in the first place. He also writes, "As the war proceeds, the need for trained psychotherapeutists will become even more apparent."

Skottow wrote a letter to Lancet in October 1940 in which he says he is against the term war neurosis as he would be against the term war pneumonia. He says that there is a joke going around that the less a man knows about psychiatry, the better he will be able to treat war neuroses. He does not feel that new types suddenly arise out of war conditions.

In another recent letter criticizing the treatment of these cases, Lane and Collier (*44*) make a plea for early and better treatment. They report two severe cases that had been admitted to a military hospital and said that the patients seem to have been treated by "studied neglect" and regarded with hostility by the military doctors. "The longer these cases go untreated, the more difficult they become to treat." They also write that exactly the same thing is happening with civilian cases, male and female, and say that some of these are receiving benefits from societies although they are curable cases.

Hendry (*20*) says that while some men could be returned after breaking, he thinks that they should not. He believes that an adequate personnel for treating these cases is one made up largely of physicians who deal with neurotics and a few psychiatrists, and says that psychoanalysts are a needless luxury.

There is more disagreement over whether neurotics should be in the army and whether they should be returned to the front if they are once broken, than there is over the actual treatment. An editorial in September 1940 Lancet is for keeping out the "doubtful tenth who will break" but does not tell who they are and goes on to say that there are some who break on leaving home, some under the ordinary routine of army life and others under strain like Dunkirk, some not at all. Two weeks after, there is a letter from Dr. Mac Calman saying that while some neurotics do badly, others do very well in the army. He gives as examples of those who do well, "the wayward youth who can't impose on himself the necessary discipline of mind for peacetime adjustment." "The man whose anxiety state depends on his family and family problems, the man who in peacetime is a martyr to inner fears and doubts, may take comfort from normal men being afraid of danger which seems insignificant to him."

In comparing the good results in front line station treatment with poor hospital results, a writer (*24*) suggests that some of this may be due to the fact that in the front line cases, temporary physiological reactions such as extreme exhaustion, lack of food and sleep, act to help precipitate an acute anxiety neurosis and that in cases like this, sedation as well as rest, food, etc., is useful. It is an important point to be remembered in the treatment of all acute anxiety states. The association of the physical and emotional side in a similar way is brought out by Sir Thomas Lewis in discussion of effort syndrome. He points out, "To take

men from sedentary employment, to take men not yet fully grown, to place them in training camps, to subject them from the first to long routine marches and strenuous exercise or drill, is to court a wastage of man-power." He feels that they need a gradual hardening up and that by a more gradual training of the men, there will be less likelihood of developing cardiac symptoms and the men will be less likely to become heart conscious. If they do they should be treated with gradual drilling and explanation that the heart is really not weak. Fifty-seven per cent of the effort syndrome cases in the last war were from sedentary occupation. These men were of highly strung and nervous temperament. Many were sensitive or garrulous, others were apathetic or depressed. It is these cases who were given the worst prognosis by the United States Army experts (*29*). Here also it is stressed that some men were sent back too soon and that too often the military officer assigning these men to duty "did not as a rule consider the mental condition of the men as much as their physical appearance."

In spite of all the knowledge that has been obtained in the treatment of war neuroses, the situation today is far from what it should be. For instance, Bowlby and Soddy (*3*) discussing the situation after Dunkirk, stated that there was a resident psychiatrist who felt that the men were mentally ill and needed psychotherapy, but the neurologist said no, that they were in need of discipline or forceful encouragement, and called them "scrum shankers." Psychiatric examination of the patient revealed much depression as well as anxiety. In a remarkable number of cases depression was associated with horror of the treatment of refugees, in these respects resembling the major depressions of civil life. "The condition of anxiety and depression called, in our opinion, for a period of rest with sedatives, followed by a suitable occupation, combined with psychotherapy. The clinician, however, was hostile to any but the most superficial therapy, remarking on one occasion that in his opinion, psychotherapy was the cause of neurosis in the last war."

The present war with its methods of mass terrorism caused by aerial bombing of the civilian population, and also the bombing and machine-gunning of large bodies of troops, is so radically different from the last war that it will be interesting to see what effect on the civilian population has been produced by the surprise attack and sudden overwhelming of countries by the ruthless blitzkrieg. It is probable that the reactions of these peoples contain the same fundamentals that produce panics in the face of disaster of any kind, but we shall not know until long afterwards whether adjustments and recovery from these panic states vary more than might be expected from the magnitude of the disaster and from the severe shock to one's sense of security, which threatened occupation by the hostile forces and subsequent bondage were bound to cause. There is at hand some evidence from a few of the occupied countries which is sufficient to throw a little light on this subject and give us a kind of sketchy sort of information on how the civilian population reacts.

An extremely acute type was described after Dunkirk by Sargant and Slater (*45*) who felt that nothing similar had been encountered during the last war. The cases showed extreme exhaustion, tension, anxiety, or listless apathy; they had tremor of the hands of the pill-rolling type, exaggerated or sluggish reflexes. Many had facies suggesting Parkinsonism, so rigid that they were thought to be organic and were sent in under that name. Mentally there were the usual anxiety symp-

toms, sleeplessness, terrifying bad dreams, a feeling of inner unrest, a tendency to be startled at the least noise, but particularly at the sound of an airplane overhead. Amnesia, more or less extensive, for the past experience. Others showed individual hysterical signs such as hysterical fits repeated at short intervals during the day. One man stood up in bed, threw his hands over his head and made a series of groans. After these subsided there was persistent air swallowing and eructation. Another said he could see his ship going down and his mates drowning beside him. Another had an hysterical twilight state lasting for days with complete disorientation and subsequent amnesia.

Trotter (*49*) has investigated fear reactions. He writes: "Panic, fear, is not directly related to the object, and derived by its subject from the reactions of his fellows—it is infectious—has the immediate effect of weakening rational judgment." He gives examples of many persons unnecessarily killed in black-outs as a result of this loss of higher intellectual functioning.

A very striking example of this is given by Abrahamsen (*1*) in his description of what happened in Oslo following the German invasion of Norway. "During the first days of the invasion, the inhabitants of Oslo, the capital of Norway—and the people elsewhere in Norway—by means of the grim bombing planes looking like ravens, and parachutes, tanks and troops of all kinds, were thrown into a state of fear and horror which resulted in a psychosis of panic on April 11, 1940. Due to German censorship, the event has not become generally known. Rumor spread that the English would bomb the city; the people began to run—old men, women and children on their way to the hills. Several strange scenes occurred. One would see old women lying more outside than inside hurrying cars, policemen were helping women with perambulators and men were running with a chair in one hand and a blanket in the other. Complete confusion ruled. Crushes took place in which many people were injured. Nobody, not even intelligent people, stopped to consider whether the rumor of a bombing was true. People stayed in chapels, cottages, woods covered with snow, and elsewhere, sitting through the night almost insensible to the cold—what they suffered at night is beyond words to describe. It was days before any of the people ventured to return to their homes. How many had hitherto been injured or killed is not known. Afterwards many intelligent people could not understand how they could become so panic-stricken because of a rumor; but as they said themselves, 'we were no longer individuals'."

An interesting article on the effect of the outbreak of the war on chronic neurotics was published in the Lancet last July by Rosenberg and Guttmann. The authors followed up ninety-six patients who had attended outpatient clinics in London for at least a year before September 1939. The types of illness included anxiety states, hysteria, obsessional states, hypochondria, depression and miscellaneous conditions such as epilepsy, post encephalitis, etc. The results of this interesting survey show that the type of mental condition, obsessions, hypochondriacs and chronic hysterics, needed no greater medical attention, nor did they develop acute symptoms requiring hospitalization. Those patients with mild depressions or chronic anxiety appeared much more likely to become acutely ill under conditions of stress.

N. B. Wright, British Medical Journal, 1939, comments on the morale of civilian populations which he feels will

depend on many factors: To a certain extent on class, to a greater extent on the density of the exposed population and greatest of all on the adequacy of the protective measures and the confidence these measures inspire. As might be expected, the various types of neuroses conform in most respects to those seen in the army and differ only in unimportant respects.

E. Mira writes of psychiatric experiences in the Spanish war in the British Journal, 1939. The fears from which civilians of any city in Spain suffered were: First, that he or his family might be killed or wounded; second, that he might be called to serve at the front; third, that he or his family might be starved; and fourth, that he might be ruined economically.

The people quickly adjusted themselves to air raids and many did not go into shelters. Increasing hunger was much worse than air raids in its psychological effects. People who would stand their ground in food queues became desperate when they failed to get the promised amount. He mentions an interesting fact, that among 35,000 cases of pellagra which had developed in Madrid by 1938, the symptoms were cutaneous rather than mental. He describes a malignant form of anxiety with anguish, tachycardia, increased reflexes and concentrated urine. At the end of a week the temperature rose, tongue became ulcerated, abdomen tympanitic, skin jaundiced, etc. Death often ensued in three or four days. An important preventive measure consisted in giving to medical practitioners regular and accurate information about the nervous symptoms they might meet and the methods of dealing with them efficiently. He further states that wherever the selection of soldiers was carefully undertaken with psychiatric possibilities in mind, the incidence of neuroses was low, and the amount of psychiatric illness did not call for an increased number of beds.

It would appear, therefore, that the war of terrorism and mass slaughter of the civilian population has not produced types of neuroses other than those encountered in the last war or in civil life. Even the acute toxic exhaustion states described by Sargent and Slater after Dunkirk may be seen in peace time, and we believe that the malignant anxiety states described by Mira in the Spanish war have also been reported before.

Among the most recent material on the treatment of war neuroses is an article in January, 1941 Lancet (*10*) discussing 1,500 cases treated in a British hospital unit. These were both chronic and acute cases. Many of them the writers found should never have been in the war in the first place as there were mental defectives, epileptics, and chronically anxious and hysterical cases among them. They found that men who broke under such a severe strain as Dunkirk were able to go back, but write: "What is surprising however, is that the hysterical mechanisms have been much more superficial in many of them, and in a few have almost reached the level of open malingering." The authors are pessimistic about the use of psychotherapy, saying: "That it is impossible by psychotherapy to reconstitute the make-up of the personality." "In any case in war radical psychotherapy is out of the question." They say that the goals for treatment should be: 1, to deal with the symptoms and bring about a return to the condition before the breakdown and 2, to readjust the individual to a socially valuable life. 3, so to arrange the future that strains which are intolerable will not have to be endured again." Like many others, they feel that it is important not to send a man back just because he is symptom free, as he may break down again under

a small strain. They stress the fact that the physician is most likely to err in his judgment by showing too great optimism, "as there is a natural bias against invaliding any man unless it is absolutely necessary." They think that in the long run, the army, country and man would benefit if more men were sent back to civilian life while there was a chance of their being able to make a good adjustment there, rather than to keep them in the army where they are never able to make a good go of it. They also make the statement, which we find again and again in the literature, "The longer a neurotic reaction is allowed to persist, the more difficult it is to deal with it." This cannot be too much emphasized. It is true for the individual and also because "Among the neurotically disposed, emotional attitudes, such as disgruntlement, panic or scrum-shanking are highly infectious." They say that psychotherapy in war neurosis has a particularly difficult side, as, "by the time a man has reached the psychiatrist he is a man with a grievance, sullen or apathetic, and all the reward he is offered for the cure is to his mind, the privilege of returning to the scene of his failure in the knowledge that he has failed."

In writing of the amnesia cases that they had, some were found to recover spontaneously; others only after rapport was established, amytal used, and it had been explained that there were buried memories which were upsetting to them. The same held true for tremors, stammering and other conversion symptoms. They write, "The psychotherapy of war neurosis is more complex than has been described by some writers who gained their experience in the last war," and "Structure of cases seen so far, especially late cases with much anxiety and depression has resembled that of occupation and traumatic neurosis of peace. Differences are shown in the striking regression that often followed being one's self, or seeing others, blown up, and in the temporary disturbance to the sense of reality caused by the bizarre effect of high explosives." They emphasize the importance of "making the patient aware of his latent hostilities. and giving him an opportunity of expressing them in a reasonable way, and to increase confidence in his powers of combat." "Some men showing aggressiveness with paranoid tendencies have it with acute anxiety states, are good personalities and come out of it. In many it is a compensation for loss of self-esteem."

The general medical man may be surprised to read that these authors say that the "Treatment of acute neurosis is almost as urgent as that of acute abdomen." They found that by the time many of their patients got to treatment, their illness was "so fixed that generally it was impossible to get them fit to go back to their former posts." "It is of the utmost importance that the acute neurotic should receive effective first aid as soon as he is seen." The patient may be built up by sleep therapy and insulin. "In all forms of drug therapy, the aim should be a large intake of fluid, not only to abolish anxiety, but also to remedy the metabolic disturbance due to and conducive to its continuation."

In getting the chronic cases well and ready to return to civilian life, occupational therapy was found useful (*21*). Men of this type were better back in civilian life than in army on restricted duty, because it was impossible to get understanding cooperation from the army—example given is that if a man were put in class C which meant home duty, he might be at a heavily bombed bridge and would break down again; in the long run, the writers feel that in-

validing the men out early will not increase the number of neurotic casualties.

In comparing the various types of treatment, hypnosis, re-education, and the modified analytic treatment which gives the patient an opportunity to recall the buried memory and relive the emotion which went with the traumatic experience, Miller brings out that while the first two types may temporarily relieve the patient of symptoms, they are often not permanent (Chaps. 6 and 7). He described a combination of hypnosis and analysis which Hadfield used. For the benefit of the medical men who may see the patient temporarily getting worse during the treatment, it should be pointed out that this may occur, but that it merely means that they are getting at the root of the matter, or at the tender point, causing pain and reaction as the surgeon may do when he attempts to get at an infection. In some cases where there were not enough doctors to go around, collective hypnotic treatments were used in which reassurance, etc., was used, and then these cases were also treated individually. At some hospitals hypnosis was used instead of drugs to put the patients to sleep at night. This state passed over to one of real sleep. The writers point to the need for individual psychotherapy at the same time. It is pointed out that "psychological analysis of war neurosis differs from strict psychoanalysis in that free association will not be used in many cases." "Interpretation will be used from the beginning with a deliberate cultivation of a friendly, positive, sympathetic rapport with the patient. The dream will be used differently, for the purpose of abreaction rather than for interpretation. Psychological analysis proceeds from above downwards. All and every detail of the traumatic episode which caused the first breakdown must be recalled, and if possible every related patch of amnesia must be filled in by free association. There is a real increase in stability and security when clear memory is restored. A clear memory, however painful it may be is ultimately better for the individual than the retention of any amnesia which is psychologically determined. If there is no amnesia to be overcome, then the period preceding the final break must be thoroughly explored. This period may be of days, weeks, or months, and is probably the most important if stability is to be restored—the attitude to danger, the growing sense of impending death, the intolerance of noise, resentment of authority and discipline." "This prodromal period is all-important, not only for treatment but for prognosis. It can be taken as almost axiomatic that the longer the prodromal period, with its gradual breakdown of tolerance, the worse the final breakdown." They feel that the cases who recover quickly by persuasion and suggestion are the ones who have had a very short prodromal period. They feel that the results of treatment depend on two things, the rapport between doctor and patient, and the doctor's insight into the patient's problem—"based not only on intuition, but on knowledge of psychopathology." The aim should be to try to get the patient back to the type of adjustment that he made before the break. The same type of treatment is to be used for civilians, for while, as the authors point out, there is not the same need to return the individual to the battle area, they also have been trying to learn to tolerate anxiety in their anticipation of raids, etc. As Riggs pointed out after working with neurotics from the last war, and Miller now writes, "It is not freedom from anxiety, but tolerance of anxiety that matters." The need for re-educa-

tion along environmental lines is discussed, gradually encouraging the patient to go out among traffic noises, to look at airplanes, read newspapers, and to mingle with his comrades. Important in prophylaxis as well as treatment is the giving of the individual a task to perform, which is to be carried out if raids, etc., begin. Frazer (*27*) points out that the longer treatment is delayed the more difficult it becomes. Another reason why early treatment is important is that the individual may 'infect' others, and a mass panic or neurosis may occur.

One cannot go over the literature of the last war without somewhat appreciating how much the knowledge of factors in etiology and treatment of neuroses developed through war experience. While therapy is being carried on as a result of this war, the same thing may take place. This is not only true of those who are treating the actual war casualties, but also those who treat the whole human group. E. Glover (*23*) brought this out when he said, "The group itself is sick, and so provides a neurotic as well as a reality stimulus for the individual. There exists nothing with which to contrast the behavior of the sick group—the fewer conclusions drawn the better, but a considerable amount of bold speculation is highly desirable. The psychologist has now a glorious opportunity of examining the effect of standard precipitating factors on different types. Observers should concentrate on changes noted in different sections of the groups corresponding roughly to the differentiated parts of the individual's mind—ethical and religious organization, seekers after pleasure, courting couples and public services and undertakings. They should also note the positive expression of aggressiveness in the community, any outcropping of perversions, and the activity of inhibiting institutions."

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CLINICAL VERSUS EXPERIMENTAL APPROACH IN PSYCHOSOMATICS

COMMENTS ON DR. JOHN WHITEHORN'S STATEMENT ON RECENT TRENDS IN PSYCHOSOMATIC RESEARCH

FRANZ ALEXANDER, M.D.*

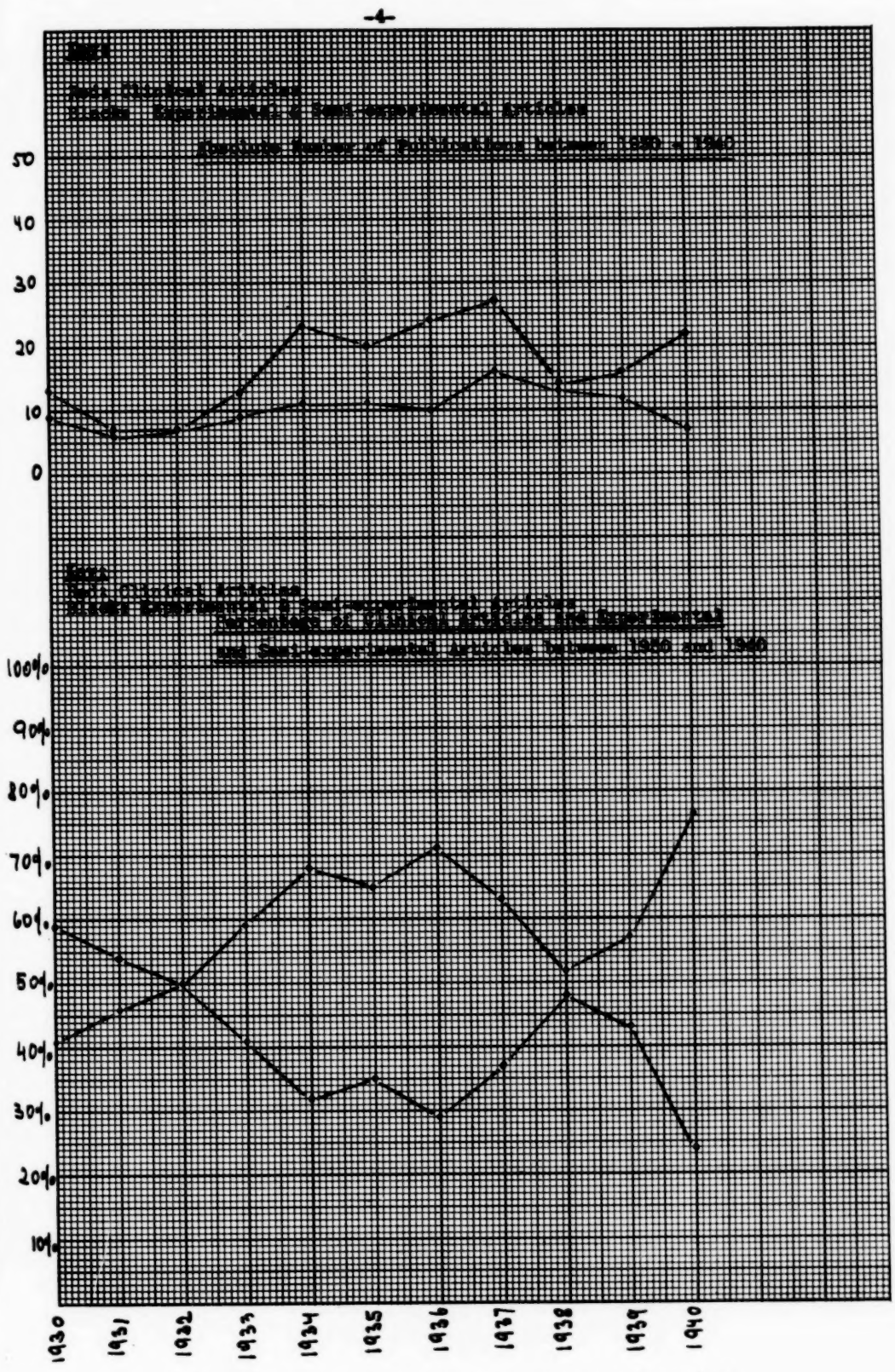
AT THE LAST MEETING of the American Psychiatric Association at a Round-Table discussion on present-day trends in neuropsychiatric research, John Whitehorn gave a brief evaluation of recent developments in the field of psychosomatic medicine.[1] He stated that recently there has been a shift of emphasis towards the experimental method away from clinical anamnestic studies. He seems to welcome this shift toward the experimental method as "a more promising one than genetic, anamnestic, clinical studies. . . . " "Such studies seem to promise a firmer grasp, with the control of more variables in our hands." His brief statement superficially appears quite reasonable, guarded and innocuous, not apt to provoke much argument. At closer inspection,however, it reveals a methodological prejudice which may have an unfavorable influence upon investigative work in this field. The attitudes of research workers of Whitehorn's calibre, holding key positions in psychosomatic research are of importance for future developments in this comparatively new territory which is about to introduce a new chapter into modern medical history. Whitehorn's brief summary contains a factual statement concerning a recent shift of trend in this field and an evaluation of this supposedly increased interest in experimental studies. Both his factual statement and his evaluation of investigative methods require a separate discussion. This discussion is written not for the sake of polemics, nor is its intention primarily to answer Whitehorn. His statement gives opportunity to clarify certain methodological issues which are most important in their influence upon the future investigative work in our field.

1) *Is There a Shift in Trend in Favor of Experimental Versus Clinical Research in the Field of Psychosomatics?* If it were true, such a shift of interest might be of symptomatic significance. Often in the development of sciences we see that the introduction of a new method for a while influences the direction of investigative work. A shift in the direction of experimental approach could be, for example, the result of stimulating and successful laboratory studies.

I do not know from where Whitehorn has received his impression. My impression was just the contrary, namely, that recently careful genetic, anamnestic, clinical studies came into the foreground, because more reliable methods have been introduced. Psychosomatic disturbances are the localized peripheral manifestations of changes in the emotional balance within the total personality. Only recently has medical interest been focused upon the total organism and the total personality and only recently have methods like the psycho-

* Chicago.

[1] Present Day Trends in Neuropsychiatric Research, Amer. J. Psychiat., *27:* 788, 1941.



Vol. III, No. 3, July, 1941, page 331, chart, key should read: . . . Top Line: Clinical Articles, Bottom

analytic one been applied to the problems of somatic medicine and biology. This explains why the study of personality development became so fruitful in the borderline field of psychiatry and internal medicine. A large number of functional disturbances of the gastrointestinal, circulatory and respiratory system have been better understood in their relation to chronic, unresolved emotional conflicts. Specific relationship between certain types of chronic emotional conditions and physiological functions has been established or at least indicated. A significant point of view in etiological thinking has been stressed, namely that structural changes may be the result of chronic functional disturbances caused by disturbances in the emotional household of the personality. In all these recent developments, laboratory experiment played a subordinate rôle, although some promising beginnings have been made, particularly in the experimental validation of clinical findings and theoretical assumptions.

Since Whitehorn in his statement obviously displayed his preference for the experimental approach I suspected that his impression might be prompted by wishfulfillment. Of course, an objective quantitative evaluation of trends in medical research is extremely difficult. Therefore, in order to have some objective basis for deciding whether my impression or Whitehorn's comes nearer to the truth, I surveyed ten years' literature in the field of psychosomatics. I selected twenty-eight representative journals which probably contain the bulk of publications in this field, and then compared the number of clinical, anamnestic studies versus experimental studies in the last ten years.[2] The result of this comparative statistical study is summarized in the graph. General articles and a few of entirely statistical nature were not listed. All studies were considered as experimental or semi-experimental in which experimentally induced or spontaneous but frequently recurring conditions were studied psychologically and somatically (correlational studies) and in which the life history or anamnestic data were not considered or played no important rôle. This study is based on 297 articles, 111 of which were experimental or semi-experimental.

The analysis of this graph can be summarized as follows. With the exception of the year 1932 the absolute number of clinical publications was greater than that of experimental studies. The range for the clinical studies is from 50 per cent to 76 per cent with an average of 63 per cent. For the experimental studies, the range is between 24 per cent and 50 per cent with an average of 37 per cent.

So far as the recent trend is concerned since 1938 there is a rapid increase of clinical studies and at the same time a rapid decline in experimental studies. In 1940 the percentage of experimental studies reached their lowest point (24 per cent), and the clinical studies reached their highest point with (76 per cent). It is noteworthy that between 1936 and 1938 the trend was the opposite: the clinical studies declined and the experimental studies increased to meet around 50 per cent. (Clinical studies were 52 per cent over 48 per cent of experimental studies.) Since 1938, however, directly in contrast to Whitehorn's contention, the

[2] Amer. J. Digest. Dis., Amer. J. med. Sci., Amer. J. Physiol., Amer. J. Psychiat., Ann. intern. Med., Arch. intern. Med., Arch. Neurol. Psychiat., Endocrinology, Genet. Psychol. Monogr., J. Abnorm. Soc. Psychol., J. Amer. med. Ass., J. comp. Psychol., J. Exper. Med., J. Exper. Psychol., J. Gen. Physiol., J. Gen. Psychol., J. Genet. Psychol., J. nerv. ment. Dis., J. Neurophysiol., Med. clin. N. Amer., New Eng. J. Med., Physiol. Rev., Psychiat. Quart., Psychosom. Med., Psychoanalyt. Quart., Psychol. Rev., Rev. Gastroenterol., Surgery.

trend shifted in favor of clinical studies which reached in percentage their highest peak while experimental studies both in percentage and in absolute number shrank to their lowest point.

The validity of such a statistical study is admittedly restricted. First, it cannot claim completeness. Second, the quantity of publications does not necessarily express in a unilinear fashion, the trend. This graph does not consider the quality and significance of contributions. It might well be that the experimental studies though less numerous were more significant and contributed more to our knowledge. This latter question certainly cannot be decided statistically but requires a difficult methodological evaluation of the state of affairs in our field, which is the primary aim of this writing. So far as Whitehorn's statement of fact is concerned our statistical studies contradict the validity of his contention, namely, that recently there is a shift in trend in favor of experimental studies. The available facts do not substantiate this, but indicate the contrary: that there is a very pronounced shift towards clinical studies.

We shall turn now to the evaluation of investigative methods, experimental and clinical.

2) *Evaluation of Clinical and Experimental Methods in Psychosomatic Research.*

There can be no doubt that in general the experimental method whenever it can be adequately employed, supplies the highest form of scientific evidence. Nevertheless, I consider Whitehorn's attitude symptomatic for a certain methodological prejudice which for a while took hold particularly of the younger generation (and only gradually begins to give place to a more seasoned attitude in medical research). The error to which I am referring consists in creating a dialectical antithesis: clinical-etiological versus experimental research without appreciating and fully understanding the complementary nature of these two types of approaches, not only in medicine, but in most fields of sciences. The roots of this prejudice are emotional: it is based on a depreciation of clinical observation and an unequivocal over-valuation of the experimental method without consideration for the nature of the field and the particular problems to be investigated. I consider the recognition of this error of extreme significance. The premature uncritical introduction of the experiment into the field of psychology was mainly responsible for the sterility of this field for almost fifty years. The best among the experimental psychologists today are keenly becoming aware of the fact that the most significant progress in the field of psychology came from clinical observations and not from uncritical and aimless experiments and that the field of psychology only lately is becoming ripe for the experimental method after clinical psychology has arrived at a workable dynamic theory of personality.[3]

Recently, a similar phenomenon can be observed in the field of psychiatry. It occurs again and again that extremely promising young students of psychiatry come to us with highly specific experimental projects before they have obtained a general orientation in the field by prolonged systematic clinical experience. Before they understand sufficiently the different psychopathological conditions, they want experimentally to correlate them in a more or less haphazard manner with all kinds of somatic measurements. The choice of their study is mostly determined by some fashionable method and not by a

[3] See particularly the symposium: "Psychoanalysis as seen by Analyzed Psychologists." J. abnorm. Soc. Psychol., *35:* Nos. 1, 2, 3, 1940. Brown, J. R.: Psychoanalysis, Topological Psychology & Experimental Psychology. Psychoanalyt. Quart., *6:* 227, 1937.

vital problem which caught their interest. They develop a somewhat contemptuous attitude toward clinical experience in which attitude they sometimes are even reinforced by their teachers. Thus, they rush into the experimental conquest of a field about which they know very little.

We deal here with a peculiar prejudice of some modern scientists manifesting itself in a blind fascination for the brass instrument, the awe for quantitative relationships even if they concern irrelevant data and in a peculiar depreciation of careful comparative observations, particularly of tentative hypotheses based on observations and on the evaluation of phenomena as they occur in nature. They overlook the fact that the first creative step always comes from methodical observation of phenomena as they occur in nature. Intelligent experimentation can only follow, after certain tentative assumptions have been drawn. Natural phenomena offer an immense number of variables which can be correlated with each other experimentally (or by arbitrary selection of variables) in almost unlimited combinations. The more complex the field is, that is to say, the more variables we have to deal with, the greater becomes the number of possible experiments; in fact, the number of possible correlations between all possibly relevant variables increases in a hyperbolic fashion. But only a small number of all the possible experiments or correlational studies is meaningful. Intelligent experimental work which is not a waste of energy and time can only begin when through careful comparative observations, the relevant and significant variables have been recognized and meaningful correlations hypothesized. The more complex and less known a field is, the more it needs the creative type of comprehensive observation viewing the totality of the phenomena and the less it is suitable for experimental studies. Moreover, in many fields experimentation is impossible, as in astronomy, where the variables cannot be experimentally controlled. However, here, as in many other fields, where the experiments of nature are sufficiently variegated, comparative observation often can fully replace the experimental method. In many fields where both experimentation and comparative observations are possible, as in biological sciences, these two methods are not antagonistic but complementary. Comparative observations, viewing the totality of phenomena as they really occur under natural conditions allow assumptions concerning the significance of certain factors and their functional relationship to each other. These are the working hypotheses which serve as the basis for experimental studies in the laboratory. However, in the study of problems in which the human personality is involved the reproduction of the natural conditions in the laboratory is extremely difficult and the isolation of relevant factors is often impossible. The usual sterility of experimental studies in this field comes from the fact that the experimental reproduction of the phenomena to be investigated is mostly quite incomplete. Yet there is an uncritical stubborn insistence upon the experimental approach which often leads to unrealistic or irrelevant experiments. The precision with which often meaningless experiments are carried out is in sad contrast to the naivete of many experimentalists in overlooking the fact that the most significant factors have been disregarded in their experimental studies.

Psychosomatic medicine is today in a phase in which there is a crying demand for careful clinical etiological studies. Almost all the significant concepts and facts of this field came from such clinical observations. Of course, continued

attempts should be made to test experimentally the preliminary assumptions and to supplement qualitative statements with quantitative relationships. The more sound and vital working hypotheses we have, the greater is the hope for relevant experiments, but unaided blind experimentation and quantitative correlational studies only for the sake of a pseudo-exactness are futile and sterile. The motto to replace clinical, etiological studies by experimental ones is most unfortunate in our field. The two types of approach must be intimately connected, clinical observation paving the way for relevant experiments. Comprehensive observation relates to experimental verification as does in mathematics the procedure of integration to that of differentiation. The creative function is the integration, its validity is then tested subsequently by the routine procedure of differentiation. In our field for a time to come obviously comprehensive clinical observations of etiological nature by necessity will have the leadership. The reasons for this are more than obvious.

Psychosomatic disturbances are mostly of chronic nature; in the last analysis most of them are the results of emotional strains and conflict situations of long standing. Only careful clinical observation and a thorough study of personality development and life experiences can give a clue concerning the relevant psychogenic factors. Only after certain correlations have become at least tentatively established can experimental studies attempt to verify, isolate and evaluate the quantitative significance of these factors. Even after a preliminary orientation has been secured by anamnestic clinical studies meaningful experiments remain extremely difficult because the relevant life situations can be hardly reproduced in the laboratory. It is most difficult to reproduce artificially fundamental basic human attitudes such as insecurity, jealousy, guilt, competitiveness, etc., in such relationships to each other as they occur in life. But even simple acute psychomotor expressions such as blushing, weeping or laughter can only very inadequately be investigated by the experimental method alone without the anamnestic clinical study of each experimental subject. One experimental subject may laugh in the same situation in which the other becomes angry, ashamed or weeps. All this depends upon the personality factors determined by previous life experience. The specificity of the psychomotor expressions in human beings is extreme. Almost no psychosomatic condition can be precisely studied in a human being without a simultaneous longitudinal study of his life history.

Nevertheless, by progressive refinement of psychodynamic and psychophysiological knowledge gradually more and more relevant experiments should become possible. But it must be obvious for anyone familiar with scientific methodology that in such a complex field as psychosomatics, experiment, correlational and etiological studies will always have to work hand in hand and not in an antithesis and certainly not in competition with each other. It is noteworthy that even in the study of experimental neuroses in animals accidental observations of clinical nature give most significant clues: for example, that an experimentally produced neurotic state in an animal may disappear or diminish in the presence of a person towards whom the animal has confidence.

It is reassuring that at the same Round Table discussion, Whitehorn's dialectic attitude was counterbalanced by the seasoned statement of Nolan C. Lewis who gave a warning by a timely quotation from Stanley Hall:[4] "Those

[4] Present Day Trends in Neuropsychiatric Research, Amer. J. Psychiat., *27:* 796, 1941.

who are inclined to see little value in ordinary clinical research should stop and consider the words of Stanley Hall: 'There will always remain a wide domain of problems that we can only solve by watching, recording and tabulating the great age-old and world-wide experiments Nature has always made and will continue to make, wherein control disturbs the conditions of normal happenings and where we can only observe and interpret data which we had no hand in making, but which are given to us.'"

Although psychosomatic research is not a field in which we have to content ourselves exclusively with those experiments which nature offers to us, it is certain that at the present phase clinical observation in the form of refined etiological studies will remain the most productive approach. Moreover, the clinical approach gives us the most secure footing and assurance that we remain in touch with the real problems. It gives us the lead for relevant experiments and saves us from attacking artificial anemic problems arranged for the needs of the laboratory. As in all fields of research, the guiding principle must be to adjust the method to the problem to be studied and not to subordinate the aims of research to methods which might be more exact and suitable in other fields but not adapted to the nature of the problems we are studying. The tendency to subordinate the research to methods has often been a cause of wasteful detours in the history of science. The method is not our master but merely our tool which we have to change and precisely adjust to the nature of the problems we are studying. The progress of psychosomatic medicine will depend upon our ability to work out the most suitable methodology. Comparative etiological clinical studies for a long time to come will have to retain leadership and show the way for fruitful experiments.

COMMENT ON DR. ALEXANDER'S DISCUSSION

JOHN C. WHITEHORN, M.D.

THE PAPER by Alexander on "Clinical versus experimental approach in psychosomatics" has been submitted to me before publication, through the courtesy of Dr. Alexander.

First of all, I deem it an honor that a remark made in an after-dinner, round-table discussion should elicit such distinguished comment. Alexander in his thorough fashion has not merely contradicted my impression of the current trend but has gathered bibliographic evidence that I may have been some two and one-half years out of date in my impression. That certainly could happen.

In regard to the main body of Alexander's discussion, I must confess to a certain annoyance at being misinterpreted in order to make me appear an antagonist for Alexander's dialectic. Aside from such personal annoyances, however, I find his remarks, on the whole, very largely in accord with my own considered judgment as to the rôle of clinical study in psychiatry. I agree with him in regretting the diversion of potential psychiatric research talent into an exclusive preoccupation with "brass instrument" experimentation, and I share with him the hopes for more significant advances through clinical study. Clinical study means more, however, than mere anamnesis.

After reading Alexander's manuscript and rereading my original remarks, I feel that he has imputed to me an attitude which I have not expressed and will not undertake to defend, namely, that of espousing the laboratory approach as more important than the clinical approach to the problems of psychosomatic medicine. He shapes up the argument as "clinical versus experimental." My own contrast has been made between "anamnestic" and "experimental." I mean by "anamnesis" the collection and formulation of the patient's past history as past history, and by "experiment" the planned control of influences which may be operative during the period of study. This, I believe, is the proper meaning of experimental, and I had noted in the recent literature an increased utilization of such control methods in clinical research.

The "experiment of nature" offers great opportunity for clinical study; but that is no reason for resting content with the mere anamnestic recording of the patient's past history. The very process—the interview—by which one gathers the anamnesis, provides opportunity for the play of personal influences; and the study of how these work constitutes a type of experimental investigation. In many patients the type of complaint and the manner of functioning of the body organs may be made to vary according to the attitude of the interviewer. It is possible also, now, to introduce endocrinological influences and to control them.

I do not understand why Alexander should raise objections to these refinements of clinical study, and I do not actually believe that he does so. He has, I presume, been misled into dialectic by a misinterpretation of the word "exper-

imental"—taking it to mean "brass instrument."

I do not know how much Alexander, in his sorting out of the psychosomatic literature of the last decade, may have deviated from my conception of the contrast between anamnestic and experimental, and so I cannot tell whether his statistical evidence shows conclusively a reversion toward the anamnestic type of study, with neglect of the experimental work-pattern. My own impression that the recent work was characterized by a greater appreciation and use of the experimental possibilities had been based primarily upon a general impression gained from random reading, and could, indeed, have been influenced by a prejudicial selection and a prejudicial evaluation.

I hope, at any rate, that Alexander does not succeed in persuading any clinical investigators to overlook, or to neglect, any available and feasible means of perceiving, formulating and controlling the influences operating in patients under investigation, out of a strained over-evaluation of the merely anamnestic.

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CONCLUDING REMARKS

FRANZ ALEXANDER, M.D.

THE GRACIOUS and judicious answer of Whitehorn closes this discussion and there is little need for concluding remarks. The discussants arrived at a full agreement. What would remain for me only is to express my regret for interpreting Whitehorn's brief statement somewhat differently from its intended meaning. The expression of such a regret would be, however, not a fully adequate statement of my feelings. Accepting the blame for such misunderstanding, my regret is mixed with gratification that it gave opportunity to raise these methodological issues, discuss them and clarify possible misconceptions.

The primary significance of the introduction of the psychosomatic point of view into medical research was to correct one unfortunate by-product of the otherwise so glorious laboratory era of medicine. This by-product consists in a gradual steering away from the biological system as a whole and the patient as an individual person towards more or less disconnected details. The longitudinal anamnestic study of the person is the basis of that synthetic point of view which recently is gaining strength in reaction to the dissecting, analytical trend of the near past. My concern is to guard this young and tender blossom of synthetic personality research from the premature frost of pseudo-exactness. On the other hand I can only join Whitehorn in demanding all possible controls in observing the experiments of nature. This is what I mean by "comparative observation." I have no argument with Whitehorn in this or in any other statement of his answer.

The greatest possible exactness consists in considering the totality of a phenomenon and it is pseudo-exactness unwittingly to disregard relevant but uncontrollable factors in order to make a phenomenon suitable for experimental study. God save us students of personality from the megalomania of play acting as physicists and aping the external mannerisms of our fellow workers in physics and chemistry who study infinitely simpler systems than the "Crown of Creation."

Periodical Literature

Carmichael, Hugh T.: A Psychoanalytic Study of a Case of Eunuchoidism. *Psychoanalytic Quarterly*, 1941, vol. 10, p. 243.

The author reports a case of eunuchoidism which he analyzed. The man was thirty-one years old and endocrine therapy had already succeeded to make it difficult to distinguish in him any physical differences from the normal man. The case history revealed that the boy had had sexual feelings before puberty, but the discovery of his failure to develop secondary sexual characteristics led the patient to make a complete denial of sexual interest and to forget his pre-pubescent sexual feelings. At twenty-three he developed compulsive habits and thoughts, mainly concerning attacking other people when sleeping. The analysis revealed that the patient unconsciously interpreted the lack of sexual maturity as evidence that his castration fear actually had been realized. When endocrine injections produced sexual maturity, he was faced with a dilemma. The strong instinctual urges clamored to be satisfied and this was not possible due to the strong defenses based on the castration fear. The patient married after the analysis.

M. G.

Van der Heide, Carel: A Case of Pollakiuria Nervosa. *Psychoanalytic Quarterly*, 1941, vol. 10, p. 267.

The case of a girl of twenty-three, suffering since the age of sixteen from pollakiuria, is reported. The symptom was preceded by a long period of hysterical vomiting which occurred after a fellatio fantasy in childhood. The accompanying "urinary envy, competition and ambition" were found to have developed as a reaction to an oral regression which resulted from traumatic experiences. The pollakiuria had the significance of an unconscious, aggressive defense against sexual wishes. It occurred when adolescent sexuality became a source of conflict and was determined by a history of extreme urinary rivalry secondary to oral regression. Competitive feelings toward men as well as toward women, but also the wish to give in a positive sense, found unconscious expression in the pollakiuria which permitted as well gratification of exhibitionistic tendencies, although in a masochistic way.

M. G.

Masserman, Jules H.: Psychodynamisms in Anorexia Nervosa and Neurotic Vomiting. *Psychoanalytic Quarterly*, 1941, vol. 10, p. 211.

The analysis of a patient with character difficulties, neurotic vomiting and diarrhea and the syndrome of anorexia nervosa is outlined. The organic dysfunctions are shown to be somatic manifestations of a highly complex personality disorder arising from severe early emotional conflicts, expecially in the oral sphere. The most important specific psychodynamism of the vomiting appears to be a symbolic rejection and restitution of the father, orally incorporated in an attempt to render exclusive the patient's basic passive dependence on the mother; however, the symptom also expresses an aggressive attack on the thwarting parents, masochistic expiation and other psychic overdeterminants. These and other psychosomatic reactions are considered in relation to the present psychoanalytic concepts of the various gastrointestinal neuroses.

M. G.

Orr, Douglass W.: A Psychoanalytic Study of a Fraternal Twin. *Psychoanalytic Quarterly*, 1941, vol. 10, p. 284.

This paper summarizes the analysis of a male fraternal twin. The outstanding psychological peculiarities connected with the patient's twinship were the following: 1) a struggle between his unique inherited potentialities and an environment that ac-

centuated his twinship; 2) a closely related conflict (not necessarily related to inherited differences however) between individuality (separate ego) and fusion with the twin (joint ego); 3) a secondary struggle, arising from the first two sets of conflicts, to obtain love and approval from the parents, at times by conforming to the twinship pattern, but at other times by being different from the twin; and 4) another secondary struggle to avoid the anxiety arising from his own hostilities in case the twin excelled and was preferred, or arising from the twin's hostilities in case he (the patient) excelled and was preferred, anxieties that could best be avoided if the patient became as much like his twin as possible. A summary of psychoanalytic literature covering the twin problem is given.

M. G.

EISSLER, K. R.: On "The Attitude of Neurologists, Psychiatrists, and Psychologists towards Psychoanalysis." *Psychoanalytic Quarterly*, 1941, vol. 10, p. 297.

Dr. Kurt Eissler discusses in detail Dr. Abraham Myerson's paper, "The Attitude of Neurologists, Psychiatrists, and Psychologists towards Psychoanalysis," *American Journal of Psychology*, 1939, vol. 96, p. 623. The "nonexistence of the unconscious," the "nonexistence of infantile sexuality," the "invalidity" of free association and transference, an "absurdity" of psychoanalytic findings, Freud's "biased evaluation of etiological factors," his "unbiological attitude," and finally the "therapeutic futility" of psychoanalysis and Myerson's arguments, are taken up for discussion by Dr. Eissler who concludes: "proof of the falsity of Freud's basic discoveries would be a vast step in the progress of mental science, but careful study of Dr. Myerson's discussion fails to reveal that it has any scientific value unless considered simply as a document humain."

M. G.

MENNINGER, KARL A.: Psychogenic Influences on the Appearance of the Menstrual Period. *The International Journal of Psychoanalysis*, 1941, vol. 22, p. 60.

With some very illustrative case histories, the author shows some of the psychogenic influences on menstruation; rejection of love object, evasion of coitus, punitive symbolic self-infliction of castration wishes and in particular the less well-recognized one of "testing out," a kind of love trial by ordeal.

M. G.

MAINZER, F. and KRAUSE, M.: The Influence of Fear on the Electrocardiogram. *British Heart Journal*, 1940, vol. 2, p. 221.

While investigating the effect of an anesthetic we came on the observation that fear of an impending operation produces remarkable change in the EKG of many persons with normal hearts. These patients were studied with EKGs sometime before they were to have operations and again immediately before. Changes noted were, "there is a strong parallelism between our EKGs and tracings of pain in coronary insufficiency, or myocardial damage." Blatz is the only one who has studied fear on EKGs.

A. L. B.

Book Reviews

KRAINES, SAMUEL HENRY: *The Therapy of the Neuroses and Psychoses.* A Socio-Psycho-Biologic Analysis and Resynthesis. Lea and Febiger, Philadelphia, 1941, 512 pp., $5.50.

This book has been written to aid the physician who has not specialized in psychiatry in dealing with his psychoneurotic patients. It covers the principles of treatment, the practicality of which is demonstrated by references to over two hundred cases from the author's own experience. After a "socio-psycho-biologic analysis" followed by a "resynthesis," the author demonstrates that many cases may be helped by the procedures which he has here described. Psychosomatic diseases, such as spastic colitis, essential hypertension, hyperchlorhydria, etc., are discussed in detail with a view to showing the rôle of the forces involved and their therapy. The rôle of the autonomic nervous system and the means by which it influences physiologic functions are discussed in the light of experimental evidence and the psychologic mechanisms are shown. Sexual problems such as impotence, frigidity and matrimonial incompatibility are described and the therapy is outlined. The various psychoses and other psychopathic states are described and the most effective and recent methods of therapy are indicated. Dr. Adolf Meyer supplies a foreword, in which he states: This is a book which "has arisen out of real life," and is "adaptable enough to encourage others to make their own working equally true to their and their patients' nature and needs."

The author recognized three decisive steps in the development of psychiatry: the classification of psychosis by Kraepelin, the dynamic concepts of psychoanalysis by Freud, and the modern shock therapies. In accordance with the author's special training, he states about psychoanalysis: "All psychiatry today has been influenced by Freud's dynamic concepts. Freud, however, elaborated upon this basic concept a vast super-structure which many psychiatrists, including the author, regard as extremely fanciful." In this volume the author has made an attempt to separate the chaff from the wheat, and to give as much of the school of psychoanalysis (limited by common consent to the school of Freud) as is of logical and practical value.

MARTIN GROTJAHN

GLOVER, EDWARD and BRIERLEY, MARJORIE: *An Investigation of the Technique of Psychoanalysis.* The Williams and Wilkins Co., Baltimore, 1940, 188 pp., $4.00.

This book will be read with intense interest by every analyst. It contains the answers (25) to a questionnaire concerning technical problems in psychoanalytic practice. This questionnaire was sent to twenty-nine psychoanalysts of the English Psychoanalytic Society. Already the scope and formulations of the questions contain a wealth of stimulation for further research; so does the interpretation and the concluding remarks of the two editors often pointing to the technical literature for further information. Usually the answers are summarized in short paragraphs. With this book an often recognized gap in psychoanalytic literature is filled: how psychoanalysis is actually performed by experienced analysts; whether the picture as it arises from these pages is a correct one and whether the chosen group of answers limited to the analysts of the English Society represent a typical group and how far their technique differs from the American scene, remains an unanswered question. The modification of psychoanalytic technique in the treatment of psychosis is mentioned, but a detailed report is postponed. Most of the space in this book is taken with for the description of the two most important conceptions of psychoanalysis, the management of interpretations (four chapters), and

the analysis of the transference (three chapters). One more chapter is taken up with the problem of termination of analysis, another one discussing the relation of theory to practice. A summary concludes this extremely interesting report.

MARTIN GROTJAHN

SALTER, WILLIAM THOMAS: *The Endocrine Function of Iodine.* Harvard University Press, Cambridge, 1940, 351 pp., $3.50.

Many books have been published on varied aspects of the thyroid gland. The present offering deals primarily with iodine and its compounds, with the physiology of the thyroid and other endocrine glands forming the background for the metabolic rôle of iodine. The intent of the author to write a natural history of iodine has been achieved quite satisfactorily.

The chapters dealing with the chemistry of the biologically important compounds may be read with pleasure by those who are not organic chemists. A very timely section deals with the current investigations on the use of radioactive or "labeled" iodine in studies on the fate of iodine introduced into the body. Technical details of methods for the determination of iodine and its compounds have been placed appropriately in an appendix.

A vast amount of data from the field of experimental endocrinology is clearly, and, in most instances, critically discussed. These sections attempt to show the interaction of endocrine functions in the maintenance of steady physiological states which Walter Cannon has so aptly characterized as Homeostasis.

The discussion of neuro-endocrine integration is perhaps not so satisfying, but states the present knowledge or opinion in this field in an adequate manner.

A brief discussion of clinical problems, with illustrative case histories, emphasizes the author's use of methods for blood iodine determination in diagnosis of thyroid disease.

It is probable that many readers of this volume will question the appropriateness of the title. It may be, as some have said, that every cell of the body elaborates its own hormone; but complexity is indeed multiplied if organic compounds may now be said also to have their endocrine functions.

EARL T. ENGLE

WILLIAM MOODIE: *The Doctor and the Difficult Child.* The Commonwealth Fund, New York, 1940, 214 pp. $1.50.

Dr. Moodie's two page introduction to this interesting little volume describes with unusual clarity and conciseness both its contents and the philosophy of its author. He says it is "an informal discussion of fundamental disturbances of behavior or personality in children and how they can be recognized, investigated and treated." This refers to the three chapters which form Part I. The second part consists of 18 brief sections, each one of which discusses a specific symptom such as lies, enuresis or anxiety.

There is, perhaps, more of Dr. Moodie's comforting and wise philosophy in Part I, which I enjoyed particularly even while taking exception to some of the views which he expressed in the first chapter. One might mention, for example, "acute dissatisfaction and unhappiness, lack of success, unsocial behavior, violent and aggressive views and policies; all have their roots in the years when the child's character is at the early and plastic stage of development." This savors too much of the unthinking overemphasis upon the rôle of environment which is so common in many a child guidance clinic and with which this reviewer has little sympathy. Moreover, it is not at all in keeping with most of the rest of the book. On page 191 Dr. Moodie says "but it is doubtful whether the essentials of any character can be changed." Or again he says, "the manner of approach cannot be stereotyped because human relationships must bear the mark of the individual if they are to have any value at all." And in a slightly different vein, on page 70, he remarks, "the best listener is the most successful therapist." He stresses constantly the wisdom of studying the individual child and understanding his fundamental needs.

In Part I, I liked particularly his introductory comments to Chapter 3, and the sections on "affection" and "direct treatment." In Part II, I found his discussions

of stealing, backwardness, sex difficulties, and psychoses both interesting and stimulating. I believe the book as a whole can be recommended to every thoughtful physician and to the more intelligent parent, with very few qualifications.

ALFRED H. WASHBURN

LENNOX, WILLIAM G.: *Science and Seizures.* Paul B. Hoeber, Inc., New York, 1940, 258 pp., $2.00.

This is a long needed book intended to educate the public concerning epilepsy and migraine. Tuberculosis and syphilis were for long considered as disgraceful and spoken of only in secrecy. Only when the problems of these two diseases were openly discussed and publicized could progress be made in dealing with them adequately. Lennox believes the time is ripe to speak openly and frankly about seizures, for over 500,000 people suffer from epilepsy alone in the United States and among them misconceptions, mistreatment and crippled lives have resulted from reticence to open discussion. The author discusses the essential problems of migraine and epilepsy in simple terms and gives to his lay readers an adequate concept of these two syndromes. Physicians may perform a service to their patients by recommending this book.

There are a number of problems raised which are of special interest to workers in psychosomatic medicine. Lennox cites the findings of cerebral dysrhythmia in "problem children." Concerning this work much qualification and confirmation is still necessary. The differentiation between hysteria and epilepsy is not without criticism, especially in light of Kardiner's recent work. Lennox does not quote fairly or deal adequately with psychoanalytic concepts and likens them to ancient ideas of demon possession (p. 72). "Psychological disturbances vary in severity from simple discouragement to a near insanity, and in treatment from a free "pep talk" to a "$2,000 psychoanalysis" (p. 123). Psychoanalysis is dangerous in that it may upset a delicately balanced emotional adjustment. "I have encountered no convincing reports in the medical literature of successful treatment of epilepsy by psychoanalysis" (p. 126). Successful treatment of migraine by analysis is nil and there are grave dangers to the method (p. 232). Lennox' description of the psychological component in migraine has almost entirely to do with what we know as secondary gain and not the essential psychogenic factors. It can be recognized from the above that the author's concepts regarding psychological factors in etiology, symptomology or resulting from the syndromes, are as naive as those of his lay readers. The book should be recommended mainly for traditionally "medical" information.

ROY R. GRINKER

BAYNES, H. G.: *The Mythology of the Soul.* The Williams and Wilkins Co., Baltimore, 1940. 912 pp., 58 illustrations, $9.00.

Except for a first chapter devoted to a statement of Jung's concepts as set forth in The Psychology of Dementia Praecox and The Content of the Psychoses, the entire 912 pages of this thick volume are given over to a study of the drawings and a few dreams of two patients stated to be borderline cases of schizophrenia. No attempt is made to give even a fairly complete case history, or to report the course of the Jungian analysis which appears to have been carried out on these patients. Instead, the effort is directed mainly to describing the drawings brought in by the patients and pointing out similarities and analogies to myths, legends, religious beliefs, and art productions of widely differing cultures and civilizations, as evidence of a relationship to the collective unconscious. (Patient I, for example, is carried by means of his drawings, which show a number of changes, through phases which are called the Cultural Psyche, The Horrific Aspect, The Heroic Combat, The Assimilation of the Dragon, The Phase of Yin, etc.) The reader is left in the dark as to what is really happening to the patient and, at the end, to the statement that the patient improved, he reacts with some surprise and with a feeling that whatever has been going on has not been communicated.

The author uses many phrases and terms with which most readers are unfamiliar, such as anima, the anima complex, the

renegade hypothesis, the renegade tendency, shadow personality, ego-complex, autonomous psyche, and many more, which he has failed to define or explain satisfactorily, so that the meaning of many passages is unclear. The word "cosmogony" appears with special frequency, as do references to a certain Siberian *Shaman* who seems to have illustrated a truly unusual number of features of the collective unconscious. The author describes on page 595 a case of a man of 48 who suffered from impotence "with symptoms of acute anima-possession," but does not explain what it is that this means. On page 416, he remarks that the background of a drawing "is characteristic of anima influence in her equivocal rôle of Hecate." Similar obscurities of thought and expression are characteristic of almost every page.

The author has only the highest praise for Jung, and informs us that he camped with Jung on the slopes of Mt. Eglon in Kenya, while studying the natives there who build soul huts to keep away the spirits of the dead. He does not appear to think much of Freud, of whom he disposes quickly in passing references to "the Freudian error" and "the Freudian fallacy." The author's interest in symbolism has enabled him not only to cure borderline schizophrenics, but also to foretell the future. One reads in the footnote to page 406 that when Hitler chose the Swastika, or sunwheel, as the heroic emblem of the Third Reich, it was not noticed that the four legs of it "run in the wrong direction—*i.e.*, against the path of the sun and the cosmic order. Thus at the inception of Nazi rule, Hitler's shadow uttered his own doom." One wonders whether the author is not using magic here in the same way as the savages, to allay his own anxieties.

LINCOLN RAHMAN

LANDIS, CARNEY and co-authors: *Sex in Development*. Paul B. Hoeber, Inc., New York, 1940, 323 pp.+xxi end papers, cloth, $3.75.

Scientific interest in the sexual development of women has led to a variety of studies. The genic and hormonal factors were first accepted as constant forces, and their effects upon the developmental pattern in growth were investigated. It was found that there was an overlapping distribution of the various characteristics measured *e.g.* size, muscle strength, attitudes and interests. Such studies indicating the genic and hormonal differences (barring occurrence of serious disease) suffice to account only in part for the primary and secondary sex characters, and not even for the reproductive behavior of each sex, at once raised the question of variability of the genic and hormonal factors. Biologists discovered that genic sex constitution could be disturbed by the environment of the fetus, by failure of the various endocrine glands to function normally in growth and development, or by various agents which modify their action (disease, physical and mental, X-ray, radium, hormone injections and malnutrition). After these preliminary investigations which proved so fruitful had been completed, it was logically necessary to learn whether quantitative variations in the factors known to affect gonad function would also affect reproductive behavior and, if so, to what degree. This was the task of Landis and his associates.

This book deals with the family background, education and social environment of 295 women in an attempt to learn whether some or all of these factors play any significant rôle in the sexual adjustments and emotional disturbances of adult life. The investigators have taken into consideration the fundamental personality traits and tendencies as well as the physical factors in growth and development. The authors themselves have criticized their methods of selection of subjects for the study and their methods of study. The limitations of the methods used have made it almost inevitable that this carefully done and conscientiously reported study should yield few results.

The investigators knew that women of all kinds, from every variety of socio-economic level, with every variety of home life, education, physical build and degree of childhood illness finally could make adequate psychosexual adjustment and live a normal adult life. They knew that a preponderance

of obviously adverse factors would make adequate adjustment more difficult and result in a greater degree or number of maladjusted subjects. Without much more relevant data and more exhaustive study of each case they could not determine the degree of interdependence of the various factors. Thus their evidence serves to correct certain current impressions regarding the incidence of sexual maladjustment and to confirm others.

Their conclusions can be summarized briefly as showing that the personality (in its broadest sense) is a complex of reactions resulting from—1) certain genetic traits, 2) prenatal influences, 3) infancy, care and handling, 4) early affective life and health and finally, 5) family, school and social relationships in childhood and adolescence. How the various factors arising during certain periods of the woman's life interact with the earlier and later ones is obviously beyond the scope of this work, which serves chiefly to indicate where further study is needed.

BORIS B. RUBENSTEIN

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NOTE: "The National Committee for Mental Hygiene wishes to enlarge its roster of physicians who have had some psychiatric service and might be available during the emergency to help keep up the work of some mental hospital. Some may be doing things which they consider not especially important; some may have retired. Obviously a person whose physical health makes him incapable of good service would not be available, but age of itself will not be considered very detrimental when medical staffs are short.

"It is requested that all those who see this notice inform the National Committee (1790 Broadway, New York City) of the name and address of any such physician. Many such men have not been actively engaged in psychiatry of late and hence are not members of psychiatric organizations, but their mental hospital experience in former years may have been of very good standard."

THE NATIONAL COMMITTEE FOR MENTAL HYGIENE, INC.

GEORGE S. STEVENSON, M.D., MEDICAL DIRECTOR